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Editorial Notes

Calorific Value

DISCUSSING the bewildering variations in declared calorific values in these columns last week we put forward the view that the values of 500, 475, and 450 B.Th.U. would cover the types of coal carbonized in Great Britain and should satisfy the preferences of any gas engineer. The more we study the matter the more convinced do we become that low calorific value declarations are a mistake and the many divergencies within a comparatively narrow range quite unjustifiable. We analyzed a dozen recent declarations, and pointed to the fact that out of these changes there were no fewer than seven different values, some of them differing by as little as 5 B.Th.U. We cannot understand why this variation should be necessary.

In general, Scottish gas undertakings, it will be noted, favour low calorific values. They steam heavily in continuous vertical retorts. They suggest that this is the way to the cheapest therm. We wonder. We recall the Paper which Mr. James Jamieson, of Edinburgh, presented at a meeting of the North British Association of Gas Managers in 1932. In it he examined the production costs of different qualities of gas from 400 to 500 B.Th.U. and came to the conclusion that with Scottish coal at any rate the most economic gas quality to produce in continuous vertical retorts was round about 450 B.Th.U. In his contribution to the discussion on the Paper which Mr. F. B. Richards gave to The Institution of Gas Engineers last June he said that nothing had happened since then to alter his views. "To force the quality higher," he remarked, "either with the object of increasing benzole production or indeed for any other purpose must in the long run mean a more expensive therm." For that reason he suggested that if maximum benzole recovery is desirable the coal should be treated in plant other than vertical retorts. The declared calorific value of the gas in Edinburgh is 475 B.Th.U., and Mr. Jamieson is washing for benzole.

In 1932, as a glance at our columns will show, we were not very convinced by Mr. Jamieson's advocacy of 450 B.Th.U. gas for Scotland. We commented on the fact that Mr. Jamieson did not emphasize in the least one of the most important factors in the efficient carbonization of coal—and that was throughput of coal per retort per day. On this factor depends economical gas production. At the time we said: "A high yield of gaseous therms per ton of coal does not, in fact, give anything like a true picture of whether a carbonizing plant—be it the horizontal or the vertical system—is being utilized to the best advantage." To-day we would stress this point once again. It is fundamental.

Throughput and Economics

WE recall also the Presidential Address of Mr. George Braidwood, of Coatbridge, to the Waverley Association of Gas Managers in 1933, in which he asked Scottish gas engineers operating continuous vertical retorts to depart from minimum coal throughput and maximum gas per ton ideas, and to give a trial to maximum coal throughput methods, paying particular attention to the quality of the smokeless fuel produced and net cost of coal. "By this method of carbonization of Scottish coals," he asserted, "gas of higher thermal concentration can be manufactured with ease, and the dread, under which many of the maximum gas yield engineers live, of being unable to maintain their declared calorific values, is removed. . . . The theory that there should be no material reduction in the make of gas per ton in the manufacture of smokeless fuel by high-temperature methods finds no support when the financial results obtained at Coatbridge by maximum coal throughput methods are studied."

What was the origin of the conception of evaluating the results of carbonizing practice on make of gas per ton of coal? What helped to mould carbonizing policy on these lines? No-one could possibly deny the great value of two important investigations into the effects of steaming the charge in continuous vertical retorts. We refer to the Fourth Report of the Gas Investigation Committee published in 1920 and to the Report of the Fuel Research Board, the findings of whose work are to be found in the Transactions of The Institution of Gas Engineers for 1921. Admirable pieces of scientific investigation, these; but it may be suggested in all seriousness that to a certain extent the conclusions which were drawn from them, economic conclusions, were not necessarily the best possible. In studying the reports and applying the findings in practice insufficient regard was paid to the

fact that in both investigations the work was carried out on a fixed throughput of coal. To our mind this fact has tended to cloud the economic issue and has had a detrimental effect on the coke market.

Steaming and the Coke Market

STEAMING in continuous vertical retorts gave the gas engineer a very handy means of balancing the fluctuations in the coke market. The very flexibility of the steaming process presented an element of security in regard to coke sales, but it may well be argued whether this element of security did not encourage a stereotyped outlook on carbonization and the race towards maximum make of gaseous therms per ton of coal carbonized. Economics of gas production, as a result of these reports, invaluable as these reports were, were based on the conclusions drawn from experiments undertaken on a fixed throughput of coal per retort per day; and it is our firm opinion that economic conclusions formed on this basis are unsound. We believe that throughput of coal per retort per day is the most important variable, from the economic point of view, in carbonizing practice. We believe that the development of the coke market suffered from this maximum make per ton idea. The Gas Industry, instead of going all out to market a good smokeless fuel in an almost limitless field, adopted a weak attitude. Instead of dictating the market, by which we mean putting forward every effort possible in the sale of coke, it allowed market conditions to dictate gas making policy.

It may be suggested that this attitude has had an unfortunate effect on the production of the cheapest therm. The cheapest therm is made when there is a good market for coke. The Gas Industry should not be lukewarm about the coke market: it should organize more to extend coke sales. The London and Counties Coke Association has been highly influential in reducing the price of gas. It has shown—at any rate it has convinced us—that with an efficiently organized coke sales policy the Industry need not fear a disastrous slump in the coke market. The suggestion we make is that it is in the interests of every gas undertaking in the country to push the sale of coke, to develop coke sales enthusiastically.

Therms per Retort

LET us for a moment consider rather more closely this all-important matter of declared calorific value and throughput of coal per retort per day Scottish coals, it is stated, do not lend themselves to the production of gas of anything like a high calorific value. Well, Lanarkshire coal was used in the tests carried out by Dr. Parker at the Uddingston Gas-Works, the results of which were published in the Fourth Report of the Gas Investigation Committee to which we have referred. We have these results before us. Test No. 1 was carried out under non-steaming conditions. The calorific value of the gas made was 544 B.Th.U. per cu.ft. Singularly enough, precisely the same calorific value, 544 B.Th.U., gas was produced at the Fuel Research Station when Mitchell Main gas nuts were carbonized in continuous vertical retorts under non-steaming conditions. At Uddingston it took over 13% by weight of steam on the coal used to reduce the calorific value to 480 B.Th.U. As far as we are aware—we are open to contradiction on this point—the first published results of an investigation into the effect of throughput on the thermal yield of retorts were those in a Paper by Dr. M. Barash and Mr. T. A. Tomlinson, of West's Gas Improvement Company, Ltd., presented at the Third International Conference on Bituminous Coal in Pittsburg in the November of 1931. A substantial extract from that Paper was given in the "JOURNAL" for Jan. 6 and 13, 1932. These Authors showed graphically how the therms per retort per day increase with calorific value of the gas made. We think the significance of that Paper has not yet been fully appreciated.

More attention, we suggest, should be paid to the retort as a unit of basic cost of gas manufacture. The time factor is one of the utmost importance; the greater the amount of coal carbonized in a given time the lower becomes the incidence of both capital cost and labour cost per therm of gas made. And this brings us to the question of benzole recovery from the gas made in continuous vertical retorts. Steaming of the charge is practised to bring the calorific value of the gas down to the declared calorific value. Would it not pay better to make a "fatter" therm with less steaming and reduce the calorific value by extracting benzole? With the coal-coke price ratio at present ruling—and likely to rule for some time—would it not be better to reduce steaming, thereby lowering the fuel costs for heating the settings, increase coal throughputs, and recover benzole? It is a question which all those operating continuous vertical retorts without benzole extraction should probe closely.

Coal Exhaustion Forecasts

AT the Annual Meeting last week of the Institute of Fuel, Lieut.-Col. J. H. M. Greenly, Chairman of Messrs. Babcock and Wilcox, Ltd., delivered his Presidential Address on the subject of the Industrial and Social Aspect of Fuel. Much of the Address was occupied in showing the importance of coal in the life of the nation, a striking statement being that, whereas one man can in the course of a year do work equivalent to 10 therms, British industry uses annually coal having a heat value of 3,000 therms for each individual employed. The possibility of exhaustion of our coal supplies due to improvident use was noted. The Address did not contain anything of direct bearing upon the Gas Industry.

The distant date, nearly 1,000 years hence, given for the possible exhaustion of British coal resources would naturally tend to prevent our generation from worrying over much about the possibility. The President's remarks regarding the exhaustion of petroleum supplies, however, were listened to with considerable attention, since the date when a real shortage of petroleum may begin may well be within the lifetime of some of us. Predictions of the date of exhaustion of natural products are generally found to be stultified by events, as, for example, Sir William Crookes's vision of insufficiency of wheat to feed the growing population, and Jevons's warning of failure of British coal supplies by 1961. Nevertheless, there is more solid substance in the prognostications of failure of petroleum. In the first place, the rate of use is increasing in an astonishing, even alarming, fashion. Figures given by Colonel Greenly show that the world consumption of petroleum has more than doubled in each decade since 1890, so that, from 10 million tons in that year, the consumption has reached 246 million tons in 1936. Moreover, the present known resources give a life of the petroleum deposits of no more than 18 years. Admittedly, the known resources are not the total resources, and Colonel Greenly is probably right in his statement that "there is little doubt that the most pessimistic view held a short time ago of imminent exhaustion is unfounded."

It must be confessed, however, that he gives no reason for

his statement, whereas he rightly points out that oil can be found only in certain geological strata, and recent experience in this country has shown that even the existence of these formations is no guarantee that oil will be found in them. He forecasts that the ever-increasing demands for natural liquid fuels will cause a shortage within measurable time, and the efficiency of use is already so high that increased consumption cannot be offset by increased efficiency as has happened with coal. It is also true that in some of the principal oil-producing countries statements have been made that the rate of exhaustion of wells is greater than the rate of discovery of new wells. There may, of course, be oil-fields as yet undiscovered, but as against this it is unlikely that the highly organized geological survey staffs of the great oil companies will have left much of the world unexplored. We do not profess to any expert knowledge upon the subject, but we cannot resist the inference from the evidence that the petroleum industry may well disappear within the lifetime of some of our younger readers. That disappearance will be accompanied by rising prices long before it occurs.

Fuel Oil Substitutes

COLONEL GREENLY surveyed the possible substitute fuels, but without coming to any definite conclusions. He pointed, however, to the possible increased use of coal in place of oil. The use of powdered coal in the internal combustion engine is a possibility now being explored, and if the light-weight accumulator can be perfected, much may be done with electrically propelled vehicles. The possibility even of a steam-driven aeroplane was not excluded. Many, however, will prefer to look to the resources of chemical research in the production of oil from coal and other natural materials, and useful information can be obtained from a recent Paper by Egloff (*Ind. Eng. Chem.*, 1938, page 1,091) on the motor fuel economy of Europe. The writer, being a petroleum technologist, is naturally interested primarily in the poor showing of substitute fuels. He finds that, taking Europe as a whole, the god of war dominates industrial policy, so that laws are made and taxes are levied with a view to future possible hostilities, rather than to current industrial economics. Nevertheless, if exhaustion of petroleum is within sight, this activity may be no bad thing, for it has focussed attention on a problem which might not be so readily solved if left to the individual.

The figures for the cost of synthetic oil by hydrogenation and the Fischer-Tropsch process given in the British reports are quoted with approval, as being in the neighbourhood of 11d. a gallon. The synthetic motor fuel plants in Germany building or completed are sufficient to produce some 2,000,000 tons of motor spirit annually; in this country we have the Billingham plant with a capacity of 150,000 tons, and in France one Fischer-Tropsch plant producing some 12,500 tons. The Falmouth Committee, of course, pronounced against synthetic oil production in this country and preferred to store petroleum. As a defence measure for the immediate future this may no doubt be sound, but as a long-term contribution to the solution of the problem of petroleum substitutes it is a negative policy. The motor trade depends upon oil; it is surprising that some of the money that is given away to other causes is not devoted to research to safeguard the life-blood of the industry, against the time when transfusion with substitute fuels may become essential. Egloff regards benzene motor fuel as of little importance, partly because of its small quantity and partly because benzene and toluene in time of war would be devoted to explosives manufacture. It is interesting to observe that Germany and Austria together produce 438,200 tons of benzene motor fuel, whereas England and France together produce 310,000 tons.

Gas Driven Vehicles

COMPRESSED gases are being used in Germany to a considerable extent, carried in cylinders at a pressure of 3,000 or 4,000 lb. per sq.in., over 150,000 tons of gasoline being displaced by compressed gas during the current year. He records that "filling stations dot Germany in a net-work which supply city gas, methane, or propane-butanes direct by filling the cylinders on the motor vehicle or replacing the empty ones. Depending on the type of compressed gas (city, methane, or propane-butane) the distances travelled by a given vehicle using two cylinder storage tanks are about 25, 85, and 225 miles respectively before they have to be refilled. It is estimated that over 25,000 German motor vehicles are using about 250,000 cylinders as storage tanks for the compressed gas." This quotation suggests that we are very slow in this country in developing the use of gas for the purpose. It would be possible, for example, for the gas and colliery industries to introduce a two-stage process, in which high C.V. gas was generated and cracked at low temperatures for use in transport, and the semi-coke was then re-distilled to generate lower C.V. gas for town's purposes. Probably, however, it would be more convenient from the distribution angle to use straight town gas. If this was done, the case for unification of C.V. would be considerably strengthened. Why, too, will our own civil servants not sanction reasonably high cylinder pressures for general use?

In Italy, also, natural gas is supplanting 40,000 tons of motor fuel annually. These facts are interesting against the background that the U.K. had in 1937 2,411,300 motor cars registered, France had 2,200,000, Germany had 1,445,700, and Italy 429,700. No doubt the relative price of motor fuels has something to do with these figures, but has it not been shown that compressed gas can compare favourably with motor spirit? The relative retail prices of motor spirit in 1937, taking Great Britain as unity, were: Italy, 3·4; Germany, 2·4; France, 1·3.

Alcohol fuels, which were forced on the motorist in many countries by legislation, appear to involve huge costs. Egloff states that "the economic strain upon the Governments of Europe due to power alcohol use has been heavy. A loss of income of about $105,000,000 was incurred during 1937 alone, based upon subsidizing the producers, tax losses, and higher fuel costs." An interesting fact is that the need for supplies of alcohol for making munitions of war has been the reason for the insistence of certain Governments upon the use of power alcohol. It seems difficult to regard either ethyl or methyl alcohol as a real substitute for 100-octane petrol under any conditions. The use of wood and charcoal or anthracite in producer-driven vehicles seems to offer distinct possibilities, and the arguments against these fuels do not appear to be very convincing. Egloff does not refer to low-temperature coke, which is making headway. He records that France has 4,500 wood-burning vehicles, and Italy and Germany 2,200 each, but significantly records that it is impossible to ascertain the numbers of coal-burning vehicles.

The conclusions that may be drawn from all these facts are: (1) It is necessary that the world should begin to make plans for fuels to take the place of petrol and diesel oil and lubricating oil, though the date of possible exhaustion cannot be foretold with assurance; (2) compressed gas is a known satisfactory substitute for petrol, and has been developed on a scale

in Germany which should be a guide for this country; (3) further development of hydrogenation, and more particularly of the Fischer-Tropsch process, should be encouraged with a view to experimenting in the direction of decreased operating costs; (4) the Gas Industry should also encourage the development of producer-gas driven vehicles, for which gas undertakings could manufacture semi-coke, using the high C.V. gas either for gas-driven vehicles or for carburetting blue water gas.

Rating and Valuation

THERE is little doubt that the time of Parliament during the coming Session will be largely occupied with foreign affairs. Domestic matters will, naturally, take second place, but it is safe to say that some attention must be given to the question of rating and valuation.

The quinquennial valuations which should have taken place next year have been postponed until 1941, and in the meantime the Departmental Committee is to consider allegations which have been made that a strict application to certain classes of property of the existing law of valuation for rating purposes would cause undue hardship, and, if these allegations are found to be justified, to report what amendment of the law is desirable. What the views of this Committee may be it is, of course, impossible to foretell, but the general view is that they will deal with domestic rather than industrial hereditaments. Among industrialists, apart from public utilities, there is but little dissatisfaction with the present position. The reason for this apparent indifference is to be found in the fact that industrial premises are derated, and therefore pay only upon 25% of their actual value. They have therefore small incentive to dispute the amount of the rateable valuation or the procedure of its ascertainment, since it is merely a nominal or notional figure.

It is therefore interesting to consider the view expressed by Mr. P. Michael Faraday in his recent Paper read before the Incorporated Association of Rating and Valuation Officers and the Institution of Chemical Engineers that, generally speaking, the assessments of industrial hereditaments throughout the country were too high. He referred to the method of assessing gas undertakings on the profits basis in which, he stated, "it is a share of the profit, after providing for tenants' interest, that goes as rent to the landlord." He appears to have advocated that this system was a fair one and could well be applied to other industrial concerns. This view would find much support among public utilities, although Mr. J. W. Napier, in the discussion which followed, suggested that "the method of gas-works valuation on the profits basis had long been regarded as unfair compared with other industries on the contractors' principle."

The Present System

AFTER an interesting discussion, Mr. Faraday is reported to have said that "he considered the present system good in principle but it was badly carried out." Mr. Faraday was dealing primarily with the assessment of chemical works, and he did not amplify his opinion. Public utilities as a whole have little to complain of the profits system of assessment. It is "good in principle," but it is "badly carried out." The procedure instituted by the Rating and Valuation Act, 1925, is admittedly unsuited to extensive hereditaments. Such undertakers should be able to go to one tribunal and there ascertain their cumulo value. Instead of that they are faced with literally dozens of separate and independent Assessment Committees, all attempting to deal with little bits of the whole undertaking. By way of appeal the public utility may go to Quarter Sessions, but even here they will probably find that the jurisdiction of the Court extends only to a part of their area. They will probably find a Bench of Justices unfamiliar with the method of public utility assessment and unwilling to commit themselves to any definite opinion on points of principle.

It is to be hoped that the Departmental Committee will consider the views of public utilities, which in the course of the year pay many millions of pounds in rates and obtain not a pennyworth of relief from the derating benefits enjoyed by other industrialists.

Salaries

Earlier this year there was considerable discussion in our correspondence columns on this leading topic, initiated by Mr. C. S. Shapley, who has always been to the fore as a champion of the right of a qualified gas engineer to receive a qualified man's salary. We all know how it comes about that an undertaking which has no intention of paying a proper salary can still often obtain a good man. It is hard to believe that in the long run this policy pays them, but the difficulty is, so to speak, to save the gas engineer from the false policy of accepting a job on the wrong terms, even as something to go on with.

The matter was raised anew by Sir Frederick West in his William Young Memorial Lecture in September; and Mr. F. G. Shaw, another champion of the oppressed, followed up with a concrete suggestion, put forward in our correspondence columns, that the opportunity should be taken, in connexion with the proposed reconstitution of the national bodies, of putting the salaries question once and for all upon a sound basis.

Editorial discussion of matters of this kind is liable to do more harm than good, and at times to embarrass those who are able to act as well as talk. It is enough for us to know that the renewed agitation in which the "JOURNAL" has taken part this year is having results, and enquiries we have made assure us on this point. While the time is not opportune to disclose the present trend of discussion, we can in turn assure our readers that the question is not being neglected, and that action is being taken in what can only be regarded as "proper quarters" in this matter which we have every reason to hope will lead to satisfactory results.

Reconstruction at Headquarters

We are indebted to the National Gas Council for a copy of the Membership List, 1938, an imposing volume indicating clearly enough the many ramifications of the Industry's central "political" body. Will this be the last edition issued by the N.G.C. as such?

We understand, though it is difficult at the moment to obtain a clear picture of them, that negotiations towards the reconstruction of the national bodies are proceeding satisfactorily. Provided the rights and just claims of each section of the Industry can be satisfactorily met, there can be nothing but welcome for some simplification of the intricacies of its present organization. Over a number of years, as is well known, committee after committee has come into existence until the calls upon the time of a comparatively limited number of voluntary workers now exceeds all reason. Any amelioration of such a situation, whether by the reduction of overlapping or by spreading the burden of committee work over a larger number of shoulders, is bound to lead to greater efficiency in the conduct of the Industry's affairs and undoubtedly to greater satisfaction which will mean still more unity.

Membership of National Bodies

At the same time, available statistics give cause for congratulation on this score, if not for complacency. Taking the number of gas undertakings as 1,241, there are as many as 391 which do not contribute to any of the funds of the national bodies.

Numerically this sounds bad; on the other hand, they account between them for only 2·6% of the Industry's output. Why they elect to stand aloof is difficult to understand. Their adhesion would naturally be greatly welcomed, but in any case the remainder of the Industry will not feel disposed to give up its unified and national efforts simply because this small section of it is deriving the benefits without paying a share of expenses.

Continuing the analysis of figures, we find that 724 undertakings pay the full joint contribution, these forming the imposing percentage of 85·8% of the total gas make of the Industry. The sum is completed by recording that the remaining 11·6% of make, representing 126 undertakings, contributes something or other to the expenses of organization, whether by way of a smaller subscription than the full joint quota, or of a contribution to only one or other of the national bodies. We should naturally like to see these all in on the full basis, but we appreciate that local circumstances sometimes create special difficulties. Perhaps the remodelling of the whole structure will remove some of these, and effect an advance towards the complete unity which is so desirable for facing the tasks before us.

National Gas Gallery

The latest news on this subject is contained in our Correspondence column this week, where Mr. T. Hardie, Chairman of the National Gas Gallery Committee, records progress. He also appeals to any who can help the Committee with information to do so without delay.

We all wish to see a success made of this effort by the Gas Industry. The back seat which we have hitherto been forced to occupy at the South Kensington Science Museum has long been a source of disquiet, and now that we have been invited to a place more worthy of our great national Industry, it behoves us to do something worthy of the honour.

There can, of course, be no question of propaganda. Anything of that nature is quite properly excluded rigidly. The purpose of the exhibit is educative—naturally on the scientific side; but because it must be essentially a museum piece, there is no need for it to assume the character which is frequently attributed to those two words. On the contrary, it should be a very live thing, and we are pleased to have been able to satisfy ourselves that this is what the organizers intend making it. Plans of which we have been privileged to learn indicate that the scheme is deserving of every support which the Industry can give to it. We are happy to know, also, that financial backing has been reasonably satisfactory, but doubtless the organizing committee would welcome the prompt promise of the comparatively small balance which would make the position secure. If those who are hesitating would now take the plunge that desirable state would soon be reached.

North London "Gas Fair"

For many years past we have been privileged to see and admire the fine show of the Tottenham and District Gas Company at the North London Exhibition at the Alexandra Palace. With the coming of television, the Alexandra Palace has assumed a new interest in the minds of the general public, and it is therefore fitting that this year's gas section should transcend all previous efforts—as indeed it does. Under the style of "Gas Fair," the section which has for some years occupied the East Entrance of the Palace has been transformed from a more or less independent series of stands into a unified and comprehensive whole, symbolizing not only the unity and progressiveness of the Industry but the greater service it can render to the community.

As Mr. H. C. Smith remarked at the official opening luncheon last week, the "Gas Fair" is the result of co-operation between the Company and most of the leading manufacturers of gas appliances—many of whom are keenly competitive. It is one of the principal bulwarks of the Industry that rival manufacturers are willing to come together and co-ordinate their efforts in this way for the greater prestige of the Industry as a whole. All credit and thanks are due to those firms who so whole-heartedly joined with the Tottenham Company in staging a unique display. We would reiterate Mr. H. C. Smith's well-merited praise of the work of Mr. Rodney Thomas, the architect, who co-ordinated all the stands into a unified whole, as well as of the efforts of the Company's Sales Superintendent, Mr. R. T. d'Eyncourt, on whom fell the detail work involved in arranging the "Gas Fair."

We are impressed by the very high standard of display-craft which has been set, and the replacement of the stereotyped "straight-line" conception of exhibition work with graceful and sweeping curves. It is interesting to know that arrangements have been made for a number of bodies associated with the Gas Industry to pay official visits to this "Gas Fair."

Personal

Mr. R. W. HANNAY, who is at present with the Aberlady Gas Company, has been appointed Manager to the Gorebridge Gas Light Company.

Obituary

The death has occurred at the age of ninety of Mr. JAMES RINGHAM, who was Chairman of the Stamford Gas Company from 1918 to 1934 and a member of the Board from 1893 to 1937. His only surviving son, Mr. James Ringham, is a member of the staff of Stamford Gas Company.

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The death occurred in Glasgow on Oct. 13 of Mr. EDWARD EDISON STONES, who retired in May of this year through ill-health from the post of Assistant General Manager of Glasgow Corporation Gas Department.

* * *

The sympathy of his numerous friends will be extended to Mr. WILLIAM CASH, F.S.A., on the death of his wife at Coombe Wood, Addington, Surrey, on Oct. 11. The funeral took place at the Parish Church, Banstead, last Thursday.

Letter to the Editor

Gas Gallery at the Science Museum, South Kensington

SIR,—Your readers are aware that the British Gas Federation is taking steps to establish a Gas Gallery at the Science Museum, South Kensington, and they will be interested to know that a series of Sub-Committees has been formed to deal with the following Sections:

Historical.
Carbonizing.
Residual and By-Products Recovery.
Storage and Distribution.
Domestic Supply.
Gas in Industry.

In each of these Sections it is proposed to show not only the latest practice, but also to trace the development of the plant and appliances connected therewith. A good deal of information has already been accumulated, but it was felt that, through the good offices of your readers, information might be obtained of the existence of drawings or models which has so far escaped attention.

The Committee is limited in its application by the exigencies of space, but is anxious that each Sub-Committee should have the fullest information possible of every original development so that each Section may properly represent its subject, and the complete Exhibit may be the success which the whole Gas Industry wishes it to be. Information of the existence of models or of genuine old appliances would therefore be particularly useful.

It would be much appreciated if your readers could assist us in any way, in which case will they kindly communicate with Mr. W. J. Smith, Joint Secretary of the Federation.

Yours, &c.,
T. HARDIE,
Chairman National Gas Gallery Committee.
British Gas Federation.

Gas Industry House,
1, *Grosvenor Place, S.W.* 1,
Oct. 14, 1938.

News of the Week

Gas Is To Be Employed for the public lighting of the New England housing scheme at Saltcoats.

Gas Cookers are to be installed at the Thanet Institution of the Kent Public Assistance Committee.

Fifty-Two New Public Lamps have been ordered from the Chertsey Gas Consumers' Company by the Local Urban District Council. These comprise 43 standard lamps, eight 600 c.p. "London" lamps, and one 1,200 c.p. "Rochester" lamp.

Twice Daily, cookery demonstrations are being given under the auspices of Hamilton Corporation Gas Department in the travelling showroom of Messrs. R. & A. Main, Ltd., from Oct. 18 to 21 and at the Children's Playground, Eddlewood, from Oct. 25 to 28.

Speaking to Members of the City Business Club at Perth on Oct. 11, Mr. A. C. Rea, Engineer and Manager of the Perth Corporation Gas Department, in the course of an address, outlined the measures to be taken to safeguard Perth's gas supply in time of emergency.

An Exhibit has been arranged by the St. Helens Gas Department at the Local Traders' Fair. The more practical side of the Undertaking is demonstrated on the balcony, where a miniature gas-works of glass, constructed entirely at the Works, shows the full process of gas production. There are also on view some of the 2,000 by-products of coal.

A General Meeting of the Southern Association of Gas Engineers and Managers will be held at the Hotel Victoria, Northumberland Avenue, London, W.C. 2, on Friday, Nov. 25, at 2.15 p.m., when Mr. S. F. Dunkley, O.B.E., of the Gas Light and Coke Company, will read a Paper on "Quality Control and a System in Operation." A Committee meeting will be held on the same day at 11.45 a.m.

The Fourth National Coal Convention, organized by the Coal Utilisation Council, which was postponed from Oct. 5 and 6 owing to the crisis, will be held at Hotel Great Central, London, on Nov. 23 and 24. As originally arranged, the Convention will be opened by the Right Honourable Oliver Stanley, M.P., President of the Board of Trade; and he and Capt. H. F. C. Crookshank, M.P., the Secretary for Mines, will be guests of honour at the inaugural luncheon.

At the Annual General Meeting on Oct. 13 Mr. E. V. Evans, O.B.E., completed his year of office as Chairman of the Association of British Chemical Manufacturers. In his speech he was able to refer to a Report which, if it contained nothing spectacular, represented a record of sound work on behalf of the chemical industry, and demonstrated that the interests of members had been closely watched and safeguarded. Mr. Evans recalled that the late Dr. Charles Carpenter had been first Chairman of the Association.

Burnley's Oldest Gas-Lamp, a venerable erection in the grounds of the Grammar School, has disappeared after 115 years' service and has been replaced by a modern standard. Of unusual shape, with a thick base about 3 ft. in height and the remainder of the standard tapering to the top, with a thin and ornamental arm, the old lamp bore the impression "Burnley Gas Light Company, 1823." Officially listed by the Corporation as "Lamp 593," the antique had been modernized by addition of four-mantle burners and clock control.

Questions were Asked at a meeting of the Birkenhead Town Council why the contract for the 3 million cu.ft. gasholder was not being proceeded with, and why it was proposed to prepare plans for another holder of 2,500,000 cu.ft. capacity. In reply, it was stated that not very long ago the Gas Committee put forward plans for the new holder and they had got as far as agreement when one of Birkenhead's neighbours laid an objection, which upset the Committee's intentions, before the Board of Trade. Both Birkenhead and its neighbour made certain moves, and the result was that no matter what they did they could not possibly start on the holder before Christmas. In view of the contents of that objection the Committee decided that the better plan would be to reduce the capacity of the holder by 500,000 cu.ft.

The Official Opening of the Kirkcaldy Town Council's new gasholder will take place on Oct. 28.

A Ten-Year Public Lighting Contract is to be entered into by the Dukinfield Corporation with the North Cheshire Gas Company.

For Cookery Demonstrations given by the Commercial Gas Company, in conjunction with Radiation Ltd., the Whitechapel Art Gallery was filled to overflowing on Tuesday and subsequent evenings last week. The attendance for that day reached the high figure of 2,644, beating the record for the first day, which was 2,623. The enthusiasm and interest shown in various appliances and in the demonstrations was most gratifying. Great interest was shown by the audience, who listened intently to Miss Hawkins, of the Radiation Research Kitchen, as she demonstrated the simplicity of cooking on "New World" gas cookers. The sales staff of the Commercial Gas Company was kept busy answering the questions of customers concerning the various appliances shown and it is believed that a large volume of business has been transacted.

Gas Sold for Industrial Purposes in Burnley continues to increase very rapidly, having risen over the last eight years from 43 to 200 million cu.ft. and now constituting 23·7% of the total sales. The Department has, therefore, included an industrial section in an exhibition now being held in the town. The appliances include furnaces for heat treatment of steel and metal melting, soldering iron furnaces, gas-heated soldering irons, gas-heated steam boiler, brazing hearths, immersion heating burners, blow pipes, glue pots, &c. Assorted burners for the conversion of central heating boilers, bakers' ovens, &c., to gas-firing will be demonstrated, together with automatic control equipment for furnaces. There are water heating displays by Ascot Gas Water Heaters, Ltd., Maxol Heaters, Ltd., and Radiation Ltd.; gas lighting by George Bray & Co., Ltd., and Falk, Stadelmann & Co., Ltd.; and easy home laundry demonstrations by W. H. Dean & Son, Ltd., the Economic Gas Boiler Company, Ltd., and G. L. Howarth & Co., Ltd.

B.C.G.A. District Conferences

For those Unable to Attend General Meeting

Owing to the cancellation of the B.C.G.A. Annual Conference which was to have been held at Brighton and because some members were unable to be present at the 27th Annual General Meeting, which was held in London yesterday, arrangements are being made for meetings in the following Districts, at which the new season's films will be shown, to be followed, after luncheon, by private discussion on the Association's Smoke Abatement Campaign and those aspects of the Association's work which are of particular interest at the present time. The Manchester District met to-day under the chairmanship of Councillor W. P. Jackson in the Manchester Town Hall. The other District Meetings in order of occurrence are as follows:

Eastern District.—To be held at the Hyde Park Hotel, Knightsbridge, London, S.W. 1, prior to the Autumn Meeting of the Eastern Counties Gas Engineers' and Managers' Association, at Gas Industry House to-morrow. The display of films will begin at 11.30 a.m. Luncheon will follow at the Hotel.

Northern District.—On Oct. 26, members will assemble in the Demonstration Theatre of the Newcastle-upon-Tyne and Gateshead Gas Company, 30, Grainger Street, Newcastle, at 11 a.m., when they will be welcomed by Mr. C. Dru Drury, M.Inst.C.E., who will take the chair. Luncheon (by invitation) will be taken at the Royal Station Hotel at 12.45 for 1.0 p.m.

Midland District.—On Oct. 27 in the Council Chamber, Shrewsbury Castle, the chair will be taken by Alderman William Adams, J.P., Chairman of the Shrewsbury Gas Light Company, at 10.45 a.m. Following addresses by the Mayor of Shrewsbury, Alderman Francis Smout, J.P., and the President, Dr. A. Wotherspoon, M.B., Ch.B., D.P.H., Medical Officer of Health, Stoke-on-Trent, will speak on "Smoke and the Public Health." At 1 p.m., luncheon by invitation of the Directors of the Shrewsbury Company, will be taken at the Raven Hotel, Castle Street. In the afternoon there will be an exhibition of films and a session for women.

The Institution of Gas Engineers

Programme of Autumn Research Meeting

As previously announced in the "JOURNAL" the Tenth Autumn Research Meeting of The Institution of Gas Engineers will be held on Tuesday and Wednesday, Nov. 1 and 2, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 1, commencing at 10 o'clock each morning.

The following Communications will be presented and discussed:

4th Report of the Research Executive Committee; 1937-38. (*Communication No.* 187.)

42nd Report of the Joint Research Committee of the Institution and Leeds University. Combustion Characteristics of Town Gas. Part III. Properties and Method of Use of the Aeration Test Burner (Model A). (*Communication No.* 189.)

43rd Report of the Joint Research Committee of the Institution and Leeds University. The Investigation of the Use of Oxygen and High Pressure in Gasification. Part III. Synthesis of Gaseous Hydrocarbons at High Pressure. (*Communication No.* 190.)

1st Report of the Gas Works Safety Rules Committee. (*Communication No.* 191.)

2nd Report of the Pipes Committee. (*Communication No.* 192.)

29th Report of the Refractory Materials Joint Committee. (*Communication No.* 193.)

Interim Report of the Sub-Committee on Unaccounted-for Gas. (*Communication No.* 194.)

15th Report of the Gas Education Committee; 1937-38. (*Communication No.* 195.)

Institution Gas Research Fellowship Report; 1936-38. The Influence of Furnace Atmospheres on the Scaling of Mild Steel at Temperatures from 1,200° to 1,400° C., by A. Alan Taylor, M.Sc.Tech. (Institution Gas Research Fellow), and J. W. Cobb, C.B.E., B.Sc., F.I.C. (Livesey Professor). (*Communication No.* 196.)

Complete Gasification of Coal and Methane Synthesis. Progress Report of Experiments at the Fuel Research Station, by J. G. King, B.Sc., Ph.D., F.I.C. (*Communication No.* 197.)

Hot Patching of Retorts by Blow-Pipe Spray Welding, by T. F. E. Rhead, M.Sc., F.I.C., M.Inst.Gas E., M.I.Chem.E., S. K. Hawthorn, M.Inst.Gas E., and V. H. Deacon, B.Sc. (*Communication No.* 198.)

The Production of Free-Burning Coke in Continuous Vertical Retorts, by James Jamieson, M.Inst.Gas E., and J. G. King, B.Sc., Ph.D., F.I.C. (*Communication No.* 199.)

Some Results Attained with Solid Fuels used in Open Grates for Heating Living Rooms, by W. Davidson, B.Sc., Ph.D., and Harold Hartley, D.Sc. (*Communication No.* 200.)

Forthcoming Engagements

October.

20.—Eastern Counties Association.—Autumn Meeting at Gas Industry House, 2 p.m.

20.—Midland Juniors.—Visit to West's Gas Improvement Company, Ltd., Manchester.

20.—B.C.G.A.—Special Display of New Propaganda Films for Members in Eastern District, Hyde Park Hotel, S.W. 1.

20.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m. Committee Meeting, 12 noon.

22.—Scottish Western Juniors.—Visit to Douglas Firebrick Company, Ltd., Dalry.

26.—B.C.G.A.—Meeting of Members in Northern District, Newcastle-on-Tyne.

26.—B.C.G.A.—Yorkshire District Conference at Rotherham.

27.—B.C.G.A.—Midland District Conference at Shrewsbury.

27.—Coke Oven Managers' Association.—Annual Dinner, Hotel Victoria, Northumberland Avenue, London.

28.—B.C.G.A.—South Wales District Conference at Cardiff.

31.—L.C.C.A.—Executive Committee, 11 a.m.; Central Committee, 12 noon; Annual Luncheon, May Fair Hotel, 1 p.m.; Annual General Meeting, 3 p.m.

November.

1.—I.G.E.—Council, The Institution of Mechanical Engineers, 9.30 a.m.; Council (continued), the Institution of Mechanical Engineers, 4.30 p.m.

1-2.—I.G.E.—10th AUTUMN RESEARCH MEETING at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W. 1.

3.—Midland Juniors.—Paper by A. V. Wainwright on "The Remote Control of a District Gasholder."

3.—S.B.G.I.—Autumn General Meeting, May Fair Hotel, W. 1. Council Meeting at 56, Victoria Street, S.W. 1, 11 a.m.

4.—B.C.G.A.—Executive Committee, 11.30 a.m.

5.—Scottish Eastern Juniors.—Tour of Works in Edinburgh Using Town Gas for Industrial Purposes.

8.—London and Southern Juniors.—Discussion on "Technical Education in the Gas Industry," introduced by Dr. J. N. Long.

12.—Scottish Western Juniors.—Address by W. R. Drummond on "The Work of the National Gas Organizations in Scotland."

17.—Midland Juniors.—Visit to John Harper & Co., Ltd., Willenhall.

18.—I.G.E.—Session at Public Health Exhibition, Agricultural Hall, Islington, 3 p.m.

19.—Western Juniors.—Visit to Portishead Generating Station, Bristol. Paper by H. C. Widlake, of Plymouth.

Forceful Smoke Abatement Display at Gas Industry House

This new Window Display in Gas Industry House forcefully thrusts home the Smoke Abatement theme, by the use of colour photography and telling slogans. On one side a charming coloured photographic enlargement shows a bride and groom radiantly smiling down on their new home, which is a spick and span, gaily coloured model house constructed in planes, against a background of clear blue sky. On the other side, in strong contrast, the house is shown dingy and smoke grimed, against a dirty grey sky. The display is completed by the slogan—"Gas and Coke = Fires without Smoke."

National Gas Council

Meeting of the Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, No. 1, Grosvenor Place, S.W. 1, on Tuesday, Oct. 11.

Representation of the Yorkshire (West Riding) District upon the Central Executive Board.—Mr. Alderman J. E. Daw, who occupied the Chair pending the arrival of Sir David Milne-Watson, welcomed Mr. J. E. Lister Cooper on behalf of the Board upon his first attendance at the meeting of the Board following his appointment as representative of the Yorkshire (W.R.) District.

Mr. Lister Cooper's resignation as Hon. Secretary of the Yorkshire (W.R.) District Executive Board was reported, and a resolution was passed recording the Board's appreciation of his services for so many years in the capacity of Hon. Secretary of that District.

The appointment of Mr. H. Burton, Engineer and Manager of the Shipley U.D.C. Gas Department as Hon. Secretary of the Yorkshire (W.R.) District was reported, and the Secretary was instructed to write and congratulate Mr. Burton upon his appointment on behalf of the Board.

British Gas Federation.

(*a*) *Nomination of Representatives to Serve on the Council.*—The following representatives were re-elected to the Council of the Federation:

Sir David Milne-Watson, Bart., LL.D., D.L.
Mr. William Cash, F.C.A., J.P.
Mr. T. P. Ridley, F.C.I.S., A.Inst.Gas E.
Mr. C. S. Shapley, M.I.Mech.E., M.Inst.Gas E.
Mr. A. W. Smith, F.C.I.S.

(*b*) *Date of Annual Meeting.*—It was stated that the Annual Meeting of the British Gas Federation would be held this year on Wednesday, Nov. 2, at 5 p.m. at Gas Industry House.

Draft Constitution of New British Gas Federation.—Reports were received from nine of the Districts which had convened meetings in order to consider this question. It was satisfactory to report that in every case the skeleton Constitution had been agreed in principle, so that the Drafting Committee could proceed to consider the different points raised at the District Meetings.

Conjoint Conference of Public Utility Associations.—It was stated that a report had been circulated to the members of the Board regarding meetings of the Conjoint Conference held on Sept. 22.

(*a*) *Coal Committee.—Nomination of Representatives of Public Utility Undertakings on Committees of Investigation.*—The names put forward by the Coal Committees as members or substitute members of the Committees of Investigation were reported.

(*b*) *Rating Committee.*—It was stated that the Conjoint Conference of Public Utility Associations had decided to give evidence before the Departmental Committee on Valuation for Rates.

(*c*) *Executive Committee.*—The Report submitted referred to matters dealt with by the Executive Committee regarding questions of Income-Tax payable by municipalities in respect of their trading undertakings, wear and tear allowance, lighting of obstructions on highways, and closer co-operation between the Post Office and Public Utility Undertakers with regard to subsurface works.

Date of Next Meeting.—Owing to the fact that representatives from the Provinces would be attending the Autumn Meeting of The Institution of Gas Engineers during the first week of November, it was agreed to follow the usual course of postponing the November meeting of the Board. It was therefore decided that the next meeting of the Board should take place on Tuesday, Dec. 13.

Home Service Activities at Bristol

Full Programme Arranged

The very active Home Service Section of the Bristol Gas Company is already familiar to our readers who will have noticed from time to time reports in our columns of its increasing influence with a great number of Bristol women. The tremendous value of that influence is too well appreciated by those who realize what Home Service means to our Industry to need any stressing on our part. The latest reports to hand show that the Sections sphere of influence continues to grow, and a very full programme has been drawn up for the winter session ending Dec. 31.

On Oct. 11 the winter session was inaugurated by the holding an "At Home" in the Colston Hall, the attendance being over one thousand. The chair was taken by Mr. George Boucher, Chairman of the Company, and Mrs. Eileen Murphy gave an address on "Home Making—British and American." All those present are members of what has become known as the "Little Theatre Circle," which now has more than 2,000 enthusiasts. Throughout the winter lecture seasons these ladies regularly attend Tuesday afternoon cookery demonstrations at the "Little Theatre." The ramifications of the Company's Home Service Section may be gauged by the fact that there are no fewer than 6,000 members on the register.

The winter session at the "Little Theatre" began yesterday when Miss Grace E. Richardson, the chief demonstrator, with her staff, were on the spot to give those who attended the benefit of their vast experience. The Organizers of the "Little Theatre" Circle, which is affiliated to the Women's Gas Council, is Mrs. Marion Clark.

The "JOURNAL" Staff

Increasing business throughout the year at 11, Bolt Court, has necessitated some re-organization of Staff, and the Directors are pleased to be able to announce that the services of Mr. A. C. Cross have been secured.

Mr. Cross' knowledge of the Gas Industry is considerable, in view of the fact that he has been engaged on the journalistic side of its publicity for many years. He is already well known to many of its members, since for a period of four years he was present in a reporting capacity at all the meetings of the principal organizations. Latterly he has contributed articles on various commercial aspects of the Industry to the trade and technical Press.

Athletic and Social

Watford and St. Albans Welfare Schemes.

The 29th Annual General Meeting of the Co-Partnership and Pension Funds of the Company was held last Thursday and was presided over by Mr. Frank H. Jones (Chairman and Managing Director), who was supported by Mr. Henry F. H. Jones, Mr. H. N. Lipscomb, Mr. Frederick Wilson, and Mr. J. Eric Palmer (Directors), Mr. G. Wilks (General Manager), Mr. T. C. Battersby (Chief Engineer), members of the Committee, and Officials. Over 200 employees attended the meeting.

The Chairman referred to the new headquarters of the Company where they met for the first time that day. Radiant House, he said, housed a very large staff which was aiming to give efficient service to the public. The Co-partnership Fund was in a very healthy state and employees now had invested in the Company no less a sum than £16,000. With regard to the Pension Fund, 37 pensioners were enjoying the benefits of the Scheme which had £79,000 to its credit. Owing to the fact that the staff was now over 1,000 strong, the cost to the Company to run the various welfare schemes had risen to over £14,000 per annum. At the last annual general meeting, the Chairman continued, it was suggested that the employees would appreciate the adoption of a hospital scheme, and to this end arrangements have been made with one of the hospitals in each of the districts. A large number of employees had taken advantage of the scheme and were having small sums, not exceeding 4d. per week, deducted from their wages in connexion with it. The total amount paid to this scheme and to local charities amounted during the year to £258.

On several occasions the local Higher Education Authorities had referred to the facilities afforded by the Company to their employees to make themselves more proficient in their work by taking evening classes. These concessions have been considerably increased during the year by the adoption of further schemes for giving financial assistance to employees in any studies connected with the Company's work.

Mr. Wilks then referred to the Company's Pension Fund, which, he said, was receiving a great deal of attention from the Directors owing to the change-over of investments which was taking place. The Company guaranteed the solvency of the Fund.

Mr. F. J. Carter (Hemel Hempstead) was returned as a member of the Co-Partnership Committee in the place of Mr. W. C. Cherry, who has retired from the Company's service after serving on the Committee for 22 years. Mr. E. Slough (Hemel Hempstead) proposed a vote of thanks to the Chairman.

Hydrogenation Cracking of Tars

The Department of Scientific and Industrial Research has issued a report entitled "The Hydrogenation-Cracking of Tars, Part IV—The Production of Aromatic Hydrocarbons from Phenols at Atmospheric Pressure." (Fuel Research Technical Paper No. 48, H.M. Stationery Office, price 1s. 3d. net.)

It is now well known that molybdenum in the form of the oxide is an active catalyst for the de-oxygenation of phenols, but at the time when this investigation was begun the effect of catalysts on this reaction had received little attention, although a considerable amount of work had been carried out on the high-temperature decomposition of phenols in the absence of a catalyst, some of the investigators claiming to have obtained a good yield of aromatic hydrocarbons from phenols.

In the early experiments, described in Section 2 of the report, the conversion was attempted solely by the use of high temperatures, but good yields of aromatic hydrocarbons could not be obtained. At 750° C., the maximum yield of hydrocarbons from the cresols was 30 to 40% of the weight of the substance treated. A considerable amount of cracking to carbon and gas occurred. In view of the formation of large amounts of gas at the high temperature necessary to effect reduction of the phenols, the use of catalysts to bring about the reduction at a lower temperature was investigated and the results are described in Section 3.

Molybdenum oxide supported on active charcoal was found to be the most active catalyst. The effect of temperature, rate of feed of the phenol, and the amount of hydrogen in relation to the phenol was studied. At a reaction temperature of 450° C. and a throughput of cresol of 0·2 ml. per ml. of catalyst space per hour, the yield of toluene was 70% by weight of the cresol treated.

Accompanying the main reaction was the formation of a small amount of polymerization products which were deposited on the catalyst, thereby lowering its activity. It was found that the activity of the catalyst was maintained for a longer time if a large excess of hydrogen was used. Attempts to reactivate the "spent" catalyst by heating in air and steam were unsuccessful, since conditions drastic enough to remove the deposit also oxidised the support. Various porous inorganic materials for supporting the molybdenum oxide were therefore tried, and the supported catalysts were found to vary considerably in activity. Bauxite impregnated with molybdenum oxide gave the best results and was only slightly inferior to active charcoal impregnated with molybdenum oxide. That bauxite-supported catalyst possessed the additional advantage that, after deterioration, it could be restored to its original activity by oxidation in air at a temperature of 500° C.

The basis of a continuous plant was thus indicated and the results obtained justified their confirmation on a larger scale. The design and operation of a small-scale plant capable of treating 2 litres of material per hour is described in Section 4 of the report. The plant included two catalyst chambers, which were used alternatively. With a throughput of 2 litres of material per hour the useful life of the catalyst was about 5 hours, while revivification of the "spent" catalyst occupied from 4 to 5 hours. The plant could therefore be run continuously by using the catalyst chambers alternately for 5 hours and simultaneously reactivating the catalyst in the chamber not in use. Results are given for the treatment of different raw materials in this plant; as an example, a continuous run using cresylic acid gave a 60% yield of toluene.

Health Talks at Cardiff

The Cardiff Gas Light and Coke Company arranged a series of Health Talks to coincide with National Health Week and the opening ceremony was performed on Oct. 3 by the Lady Mayoress of Cardiff, Mrs. O. Cuthbert Purnell.

In addition to the talks given by Mr. T. Bowen Partington, F.I.L., F.R.E.S., suitable cookery demonstrations were given by Miss Curd, of R. & A. Main, Ltd., a model all-gas kitchen designed by the Kitchen Planning Centre was exhibited, and Home Laundry, demonstrated by W. H. Dean & Son, of Burnley. Co-operation with the City Public Health Department was obtained and a Bureau established for distribution of suitable literature.

The Health Week can be accounted as being a complete success, as the talks and demonstrations were given to some 900 consumers. The meetings became so popular that arrangements had to be made for relaying the talks from the lecture hall to the ladies' rest-room. Miss Rowe, of the Kitchen Planning Centre, gave a lecture to 50 students of the South Wales and Monmouthshire Training College of Domestic Arts, and Mr. Partington gave a lecture to the students, numbering 600, of the Cardiff High School for Boys.

This successful week followed closely upon a week's Continental Cookery Demonstrations given by Miss Zimmermann, of Radiation Ltd. These demonstrations proved to be exceedingly attractive, as more than 900 people attended.

Some 2,000 consumers have attended lectures and cookery demonstrations in the Cardiff Company's lecture hall and showrooms during the past three weeks.

Women's Gas Council

Safeguarding the Home

The next meeting of the General Consultative Committee of the Women's Gas Council will he held on Monday, Oct. 24. After the business session the Dowager Marchioness of Reading will speak on the work of the Women's Voluntary Services and will tell delegates how they and their branches can assist their local authorities in A.R.P. work.

Liverpool Rally

On Oct. 11, Miss K. M. Halpin, Organizing Secretary, spoke to a crowded audience in the demonstration hall of the Liverpool showrooms. Mr. J. Sandon Stubbs, Secretary and Treasurer of the Company, was in the chair. Over three hundred members from the newly-formed branches of the Women's Gas Council at Prescot, Ormskirk, Northwich, Runcorn, Frodsham, and Leyland were present. The branches are in the area of the United Kingdom Gas Corporation, Ltd., who organized the meeting.

Miss Halpin described the work of the Women's Gas Council, pointing out its place in the modern development of women's work. She spoke of her recent visit to Canada and the United States of America, comparing women's interests there with those of women in England.

A display of films was shown at the end of the meeting, which included one made under the direction of Mr. Keay, Housing Director for Liverpool. This film dealt with housing conditions in Liverpool, and gave an insight into the new housing schemes in that City, in which gas is being used extensively for cooking, heating, and water heating.

British Standards Institution

Specifications for Carbolic and Cresylic Acids

The British Standards Institution has just issued a revision of the specifications for Carbolic and Cresylic Acids as follows:

515—Carbolic Acids 60's.
517.—Cresylic Acids of High Orthocresol Content.
521.—Cresylic Acid 50/55% Metacresol.
522.—Orthocresol, Metacresol, and Paracresol.
523.—Phenol.
524.—Refined Cresylic Acid.

These specifications lay down requirements as to the properties and purity of the materials, and specify limits for certain properties, and impurities, such as specific gravity, crystallizing point, residue on evaporation or on distillation, neutral oils and pyridine bases, alkalinity or acidity, and certain other special tests depending on the material specified.

Standard methods of test for determining these properties are given in full detail as appendices. These methods have been based on the standard methods of test developed by the Standardization of Tar Products Tests Committee, and acknowledgment is made to them for their work in the development of these methods. It should be noted that the tests given in the British Standards are for determining the compliance or otherwise with the specification and are not necessarily applicable to all grades of carbolic or cresylic acids.

Copies of these British Standards, Nos. 515, 517, 521, 522, 523, and 524, can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 2s. 2d. each, post free.

New Le Bas Tube Director

Mr. Henry Robert Hiscott, London and General Sales Manager of Le Bas Tube Company, Ltd., has been elected to the Board of Directors.

After a period at the School of Engineering and Navigation Mr. Hiscott served an engineering and drawing office apprenticeship. His progress was unfortunately checked by the war, during which he served as an Engineer in the Royal Navy and the R.N.V.R.

The last 17 years has seen his steady rise to success and the success of the Le Bas Tube Company. First London Sales Manager, he then became General Sales Manager and now joins the Board to deal with the sales of "G.F.," the well-known malleable iron pipe fittings, not only in Britain but throughout the Empire.

He has lectured on the manufacture of gas piping and fittings to London and provincial senior and junior associations and read a technical Paper to the Waverley Association of Gas Managers in 1929.

Meter Testing at Glasgow

Meter testing fees received by the Gas Meter Testing Department of the Magistrates of the City of Glasgow were slightly less during the twelve months to May 31 than in the previous year, at £2,247. This was because the number of meters tested (34,584) showed a decrease on the previous year of 2,749. Of the total number of meters tested, 9,220 were new, 25,056 had been repaired, and 308 were submitted on behalf of gas consumers for certification as to correctness. Of this total number, 759 were rejected—most of them through registering more than 2% fast. On the other hand, no fewer than 183 of the total rejects registered more than 3% slow, while 26 were turned down for passing gas without registering. Undue oscillation was recorded in 57 cases. Analyzing the figures further, it is seen that of the new meters tested 9,098 were stamped and 122 (1·3%) were rejected, while in the case of the repaired meters tested 24,626 were stamped and 430 (1·7%) were rejected. In both instances the percentage of rejects is exceedingly small, but with the meters submitted on behalf of gas consumers, the proportions are widely different—101 stamped and 207 (or 67·2% of those tested) were rejected. Even so, however, some 33% of the meters submitted on behalf of gas consumers were found to be correct.

"Gas-Works Effluents and Ammonia"

On Nov. 1 The Institution of Gas Engineers will publish a book on "Gas-Works Effluents and Ammonia" by Arthur Key, D.Sc., Ph.D., Research Chemist to the Institution. The price of the publication will be 5s. net.

The book comprises a summary of the results of the investigations of the Liquor Effluents and Ammonia Committee, and its predecessors, of the Institution during the past twelve years, together with a comprehensive survey of the present state of knowledge regarding the problems connected with the recovery and utilization of gas-works ammonia and the disposal of effluents therefrom.

Institute of Fuel

The Annual Dinner, Dance, and Cabaret of the Institute of Fuel was held at the Connaught Rooms, Great Queen Street, London, on Thursday, Oct. 13, when there was a company of over 700 members and guests and their ladies. The President (Lt.-Col. J. H. M. Greenly, C.B.E.) was in the Chair and the guest of honour was Prof. Sir William Bragg, O.M., K.B.E., F.R.S.

Prof. Sir WILLIAM BRAGG, F.R.S., proposing "The Fuel Industries," said the Institute of Fuel was of comparatively recent creation but the fact that it had been so successful was sufficient indication that it deserved to be what it was. Fuel conservation was one of the very great questions of the day and now that they were using more and more fuel for all sorts of purposes, it became a matter of absolute importance to see that all forms of fuel were properly and economically used.

The PRESIDENT, responding, said that was the occasion of the twelfth annual dinner of the Institute of Fuel, which was founded in July, 1927. The total membership of the Institute was 1,100, and 29 different countries were represented in that membership. The past year had been a successful one for the Institute.

The President then presented the Student's Medal and the Melchett Medal.

The Student's Medal of the Institute was won by Mr. M. W. Thring, at present engaged on research work with the British Coal Utilisation Research Association. The Melchett Medal was awarded to Prof. R. V. Wheeler, of Sheffield University.

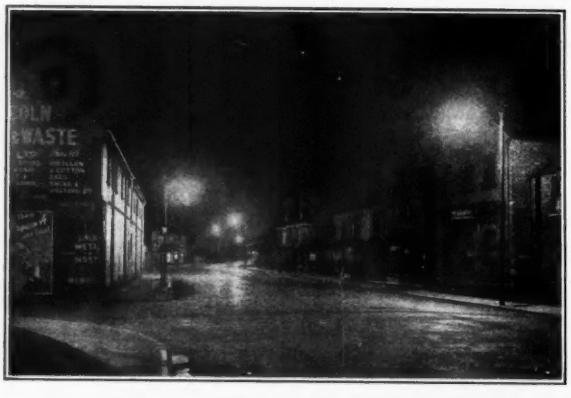
Prof. WHEELER expressed his thanks.

Sir DAVID MILNE-WATSON, Bart., proposed the toast of "The Visitors," coupling with it the name of Capt. Crookshank.

Captain H. F. C. CROOKSHANK, M.P. (Secretary for Mines), responding to the toast, said this was the third consecutive year when he had had the privilege of speaking at the Institute Dinner, and he felt he must almost have passed out of the category of visitor into that of permanent guest. He expressed the thanks of the Government—and, he thought he might say at the same time the thanks of the whole nation—for the support and assistance given during the crisis by the fuel industries of this country.

Lighting Improvements at Lincoln

The accompanying photographs show the excellent results of a new gas lighting installation at Lincoln. The nominal candle-power of these Keith high-pressure lamps is 1,500, mounted at a height of 25 ft., with an average spacing of 105 ft.



French Gas Industry

Review of the 61st Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

RESERVOIRS AND CYLINDERS FOR COMPRESSED GAS.

A. Pignot and P. Dautriche reviewed current practice in France, Great Britain, Germany, and Czechoslovakia in connexion with reservoirs and cylinders for compressed gas.

For the calculation of the wall-thickness of gas cylinders, the "shell" formula and Lamé's formula are available. The former is independent of any hypotheses as to the elastic properties of the wall, whereas the latter takes them into account. A modification of Lamé's formula, due to Malaval, is employed by the French naval authorities.

The object of the formulæ is to provide an indication of the wall-thickness necessary to ensure that the permissible tensile strain will not be exceeded for a given internal diameter of the cylinder.

Rupture tests recently carried out under gas pressure have shown that bursting of steel cylinders is not accompanied by splintering. Tests have also demonstrated that the gas does not inflame when rupture occurs.

The following characteristics are regarded as necessary in the case of storage reservoirs:

(1) *Properties of the Steel.*

Ultimate stress—at least 38 tons/sq.in; Elongation—at least 14%; Impact strength—at least 2·5 tons/sq.in.

(2) *Properties of the Vessels.*

The tensile strain of the metal under the working pressure should exceed neither 0·4 times the ultimate stress nor 0·5 times the elastic limit.

The permissible tolerances in dimensions should be as follows:

External diameter, ± 0·12 in.; Thickness of metal, ±15%; Capacity, ± 5%.

These tolerances are to be taken into account in the calculation of the wall thickness.

Vessels should be hydraulically tested for 5 minutes at 1·5 times the working pressure and the test, which should give rise to no permanent deformation, should be repeated at intervals of 5 years.

Plaques for record purposes should be welded on the cylinders and should not be riveted or fixed by means of screws. It is, also, undesirable to stamp marks even on the necks of the cylinders since they may provoke rupture.

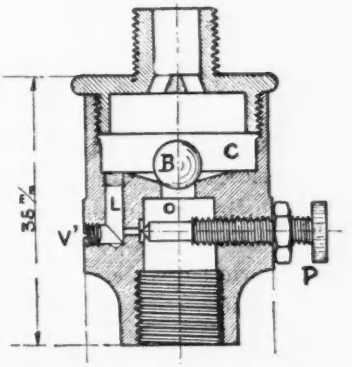
As regards the possibility of super-compression, no fears arise during filling since the reservoirs are protected by the safety-valves of the compressor. Moreover, the reservoirs do not, strictly, serve to store the gas but act as buffers between the compressor and the cylinders to be charged. During the hottest hours of a summer day, they are, therefore, constantly in course of being charged and discharged and this constitutes the best possible safeguard. If they remain for a few hours under pressure, this will only be during the night, in the course of which the pressure, far from increasing, will actually fall by 150-300 pounds/square inch depending on the season.

SIMPLE MEANS FOR THE REMOTE EXTINCTION AND RELIGHTING OF PUBLIC LIGHTS IN CASE OF ALARM.

According to Ch. Delahaye and V. Jean, the question of the rapid extinction of street lights by remote control in case of alarm is a problem of passive defence of great interest to the Gas Industry in view of the fact that certain administrations do not hesitate to prescribe the complete abandonment of street lighting by gas in case of war. This would rapidly lead to its final abandonment even in peace-time.

Though pressure-wave control provides a satisfactory system, it necessitates the maintenance of the pressure between certain limits after the emission of the wave, hence it is not always practicable in large towns where the pressure may vary with the locality and with the time. Where lights are clock-controlled, the replacement of the mechanism with another expensive device would be very costly.

In time of alarm it is always possible, and it may even be obligatory, to reduce the general pressure in the distribution system. In the case of clock-controlled lamps, it suffices to install, between the lighter and the burner, a simple device which closes when the pressure is reduced below a predetermined value. If it be desired to extinguish the lamps during lighting hours, it then suffices to reduce the supply pressure below this value. When the "all clear" is given and the pressure is restored, the effect ceases and the lamps will relight if the hour is still in the lighting period, whereas they will remain out if this period has passed.



Hexagon, 24 Mm. Over Flats.

Arrangement without pilot. If a pilot is used it is connected at V^1 and the plug is transferred from V^1 to the top of the conduit L.

The device in question was invented some years ago by V. Jean, of Saint-Brevin, where it was in use for more than six years for the automatic control of lamps by pressure differences. It has now been adapted to the objects at present in view. The unit, which has a diameter of 1 in. and an overall height of less than 2 in., embodies a small chamber with a conical base pierced with a cylindrical orifice which becomes closed by a metal ball when the gas pressure is sufficiently reduced. An internal lateral conduit, the gas supply to which is adjusted by means of a needle valve, effects communication between the up-stream and down-stream ends of the unit and permits of the admission of a small supply of gas to the burner when the ball obstructs the orifice during the alarm period. From the body of the unit, up-stream of the metal ball, there may branch a pilot connexion in which case the consumption of the pilot is regulated by the above-mentioned needle valve which is coaxial with and diametrically opposite to the pilot connexion. A screw plug may be used for the purpose of closing either the pilot connexion or the lateral conduit.

The dimensions of the orifice and of the ball are such that, during lighting hours, the ball is kept floating by the normal supply pressure and the gas is able to pass to the burner which functions normally. During an alarm, the supply pressure is lowered, the ball drops on to the orifice and the burner is partially or totally extinguished according as a pilot does not or does form part of the device.

The fitting may thus be used in one of two ways:

(1) *With a pilot.*—In this case, the lateral conduit is closed with the plug. Relighting at the end of the alarm period occurs automatically, when the normal pressure is restored, as a result of the presence of the pilot which will have been in action throughout since its gas supply is up-stream of the ball.

(2) *Without a pilot.*—In this case, the lateral conduit is left open and the pilot connexion is closed by means of the plug. The lateral conduit passes sufficient gas to ensure that the burner is always supplied with a small quantity of gas insufficient to produce any incandescence in the mantle.

The device is cheap and, in general, a single type will suffice for the whole lighting system. In view of its small height, it may be fitted directly to street lamps without any modification of the latter whether they are provided with automatic lighting and extinguishing arrangements or not.

It contains no fragile organs which can deteriorate during storage or use, and it can, therefore, be stocked in peace-time in readiness for installation in case of an emergency, or it may be

fitted in peace-time without upsetting the normal course of lighting. It is, moreover, possible to install the device without the ball and to insert the latter in time of crisis.

The following particulars may be given of the value to which the pressure must be reduced to effect extinction of the lamps in relation to the diameters of the orifice and the ball. The normal supply pressure is assumed to be 3·28 in. w.g. The values are applicable to single upright burners and to clusters of three and five burners.

Orifice Diameter, Mm.	4·5	4·0	3·5
Ball Diameter, Mm.	Pressure for Extinction, Inches W.G.		
4·8	1·26	1·50	1·77
5·0	1·38	1·69	2·05
5·2	1·69	1·97	2·13
5·5	1·77	2·05	2·44

HORIZONTAL RETORTS IN WORKS OF MEDIUM SIZE.

A. Nerrière described a series of appliances, devices, and methods of control which serve to render horizontal retort installations more automatic, to improve working amenities and to ensure constancy of operation. They have been used very successfully in the works of the Société Lebon & Cie., where stop-ended retorts are employed with mechanical charging and discharging equipment.

Though the use of horizontal retorts cannot be justified in the case of undertakings with a gas output above a certain maximum, experience has shown that, for gas-making capacities extending to 500,000 or 700,000 cu.ft. per day, a properly equipped setting of 10-ft. horizontal retorts is capable of giving very good results.

Temperatures should be read at least once daily in the interior of the retorts. Seger Cones should be mounted in the setting and should be so chosen that the most fusible one squats at a temperature in the setting equivalent to a predetermined temperature inside a particular retort at charging time. For peak-load requirements, some firebrick units should be available in addition to the main silica brick units since they can be shut down or started up, when necessary, without damage.

The use of jointing cements containing 15% of glucose is recommended and a refractory silica cement should be used throughout, even for firebrick settings, in order that dropping of cement on to the burners may be prevented.

Clinkering of the producers may be rendered a more comfortable operation by provision of suitable hoods over the doors and of an exhaust fan to remove dust and fumes.

An automatic regulator capable of maintaining the draught constant to within $\frac{1}{250}$ in w.g. is a useful adjunct.

The pressure inside the retorts should be maintained at zero or, more correctly, in equilibrium with that prevailing in the heating system. Generally, pressure control will be provided by the exhauster governor with a large by-pass branched, not from the outlet main, but from a central point of the hydraulic main. To avoid surging caused by the dip seal-pipe, the seal-pipe may be fitted with a detachable end operated by means of an external lever so that the seal is only in use while a retort is open. Adequate pressure control implies freedom from blockages in the ascension pipes. An auger with a head fitted with four steel knives may be mounted on a monorail to enable it to be brought over any ascension pipe. It may be lowered and raised by means of a motor-driven winch with suitable operating gear. Rods of different lengths may be employed for the individual rows of retorts. Augering should take place one or two hours before a retort is to be charged.

The liquor circulating system should be provided with an overhead constant-level tank and a cooler. An adjustable funnel in the hydraulic main serves to control the level of liquid in the main and the liquor flows from it by way of a syphon to a sump whence a pump, driven by a motor controlled by a float in the overhead tank, returns the liquor to the tank. The cooler is situated between the tank and the liquor sprays.

For works of medium size, dilution of the coal gas is best effected by means of producer gas. Constancy of calorific value within the desired limits is attainable if the addition of producer gas is automatically controlled. A suitable device embodies a Bunsen burner which heats the water contained in a circulator equipped with a thermo-syphon system and a cooler on the water return circuit. The temperature rise of the water is a function of the calorific value of the gas. [A duplicate of this equipment may serve to record the calorific value of the mixed coal gas and producer gas and may be set, daily, against a standard calorimeter.] A lever system attached to a thermostatic element actuates a variable-level water overflow which controls a float which regulates the producer gas supply-valve and a bell-float which acts on the by-pass regulator of the exhauster so as to eliminate suction in the collecting main if the coal gas has too low a calorific value.

In general, if a gas having a calorific value of 500 B.Th.U./cu.ft. is to be distributed, the amount of producer gas to be added will be about 18% by volume.

The producers should be fitted with sufficiently large flues in view of the presence of dust in the gas and gas for dilution should be drawn from a large number of the working producers. Each gas uptake should be capable of being cut off from the producer gas collecting-main by means of a valve. The producer gas should be cleaned and cooled by passage through a tower scrubber. It may be passed by fans to a point situated at the outlet of the hydraulic main, the quantity being measured by means of a meter, preferably of the volumetric type. A non-return seal serves to prevent back-flow of gas to the producers.

It is very useful to provide, for the producer gas, a CO_2-recorder to which the producer gas uptakes are connected in parallel.

A recording calorimeter should be provided for the gas leaving the works. Gas should not be sent out from a holder which is being filled

A recording gravitometer, while not essential, is to be recommended.

The pressure in the distribution system may be regulated in accordance with that required to provide the necessary amount of gas by means of a hydraulic system actuated by means of a special cam with a profile corresponding to the hourly variations in the normal demand.

In a works of medium size, an auto-truck holding 10 cwt. of coal and driven by means of a single-cylinder air-cooled petrol engine provides a convenient device for bringing coal to the retort-house. For a larger works, a 1-ton accumulator-driven truck, embodying an elevator to pick up coal from the coal park, may be employed.

Coke-handling may be by way of a monorail. The hot-coke skip may be carried on the monorail to the quenching station where it is brought to rest against an abutment fitted with a suitable hook which serves to retain the skip in position. A lever, actuating a valve supplied with water from an overhead tank, is fitted with an adjustable automatic-return device which regulates the quenching period. The monorail track may be arranged with a view to enabling the coke to be conveyed to the coke store, where it is stacked with the aid of a portable elevator, or to the screening plant. The coke-cutting plant embodies bagging appliances as well as loading chutes for lorries. Elevation, cutting and screening are entirely automatic.

For tar handling, a monte jus system is very convenient.

(To be continued).

Wales and Monmouthshire Juniors

Opening Meeting

The opening meeting of the Wales and Monmouthshire Junior Gas Association was held at the Mackworth Hotel, Swansea, on Saturday, Oct. 8, when a large number of members were present for the induction of the President-Elect, Mr. F. Stuart Johns. Mr. H. V. Williams, the retiring President, occupied the Chair.

At the last Annual Meeting Mr. A. E. Pask, of Monmouth, was elected President for the Session 1938-39, but owing to unforeseen circumstances he later found that he would be unable to accept the office and so the Senior Vice-President, Mr. F. Stuart Johns, of Swansea, was asked to fill the vacancy, which he did. Consequently Mr. R. T. Mills, of Cardiff, and Mr. D. W. Rees, of Neath, were elected Senior and Junior Vice-Presidents respectively. Mr. W. R. Branson was elected to fill the vacancy on the Council.

Mr. W. H. Johns, Engineer and Manager of the Swansea Gaslight Company, extended a welcome to the Association on behalf of his Company. A vote of thanks to Mr. Johns was moved by Mr. H. V. Williams and carried unanimously.

Mr. WILLIAMS said the time had come for him to vacate the Presidential Chair. He had known Mr. Johns for some years, and knew that as President he would be the right man in the right place.

Mr. Johns then read his Presidential Address, which will be found on other pages of this week's issue.

Mr. Johns said he now had a pleasant duty to perform. That was the presentation of the Past-President's Certificate to Mr. Williams.

Mr. Williams, in thanking the members for the Certificate, stated that his year of office had been a very enjoyable one. The success of it was due to the admirable assistance he had received from Mr. K. M. Ernest, who had held office as Secretary exactly one year to that day. He thought the members would join with him in congratulating Mr. Ernest on a job of work well done.

The Association were afterwards entertained at tea by the Swansea Gaslight Company. A vote of thanks to Mr. Johns and the Company was proposed by Mr. I. G. Jenkins and seconded by Mr. R. T. Mills.

Manchester District Association of Gas Engineers

A General Meeting of the Manchester District Association of Gas Engineers was held at the Midland Hotel, Manchester, on Friday, Oct. 14—the PRESIDENT, Mr. E. Astbury, M.I.Mech.E. (Liverpool), in the chair.

The meeting was preceded by a luncheon, at which the customary loyal toast was proposed and duly honoured.

"The Guests."

The PRESIDENT, in extending a welcome to the guests, said that one of them, at any rate, was no stranger in their midst—namely, Alderman J. Toole, J.P., a member of the Manchester Corporation Gas Committee. They all recalled the great interest he took in the Association when he was Lord Mayor of Manchester, and that he even went so far as to arrange a visit to a works at Darwen where they all spent a very interesting and enjoyable day. He was also delighted to be able to welcome Lt.-Col. Albert Buckley, Deputy-Chairman of the Liverpool Gas Company, to whom and to the other Directors of that Company, he, the President, owed a deep debt of gratitude for the support they had accorded to him during his Presidency of the Association. Another visitor was Mr. Bernard Glover, M.Sc., A.M.Inst.Mech.E., Chief Engineer of the Primitiva Gas Company, Buenos Aires. Mr. Bernard Glover was the son of Mr. Thomas Glover, of Norwich. There was also with them Mr. H. Sandon Stubbs, the Secretary of the Liverpool Gas Company. He also extended a special welcome to the Diploma students and the Higher Grade students who were present.

Alderman J. TOOLE, J.P., responding, said there was nothing more romantic in the industrial history of this country than the story of the Gas Industry. In spite of keen competition, and sometimes Government subsidies, it had more than held its own owing to the technical knowledge, and "drive" of the engineers engaged in it, and also in no small measure to the makers of appliances and equipment who had kept themselves well in advance of the times by supplying the things which people not only needed but which the makers, in their wisdom, thought they would need.

Lt.-Col. ALBERT BUCKLEY also responded to the vote of thanks, saying he had been connected with the Gas Industry now for some seven or eight years. Like other people he had previously been inclined to think that gas would not be used in the future to the same extent it had been in the past. He realized now that that was not the case. They were as yet only touching the fringe of the industrial side. A great field for commercial enterprise lay before them in regard to by-products. The reason why gas had held its place in spite of extreme competition from electricity, fuel oil, &c., was owing to the skill and perspicacity with which it was managed.

The General Meeting.

The HON. SECRETARY (Mr. H. Shipley) having announced apologies for absence, Messrs. A. Whiteley (Kirkburton) and L. B. Chapman, B.Sc., were elected scrutineers of the ballot papers for the election of officers of the Association.

Upon the ballot being taken, the result was declared as follows:

President.—H. Singleton (Huddersfield).

Vice-Presidents.—T. Reynolds (Stockport) and J. E. Lister Cooper (Yeadon).

Hon. Secretary and Treasurer.—H. Burton (Shipley).

Auditors.—Francis Elliott (Leyland) and J. W. Brearley (Swinton and Mexboro').

Committee (three vacancies).—C. H. Bamber (Rochdale), C. Bateman (Harrogate), and G. E. Currier (Bradford).

The members rose in silent tribute to the memory of the late Mr. W. W. Woodward, member from 1904; Mr. E. H. Hudson, F.C.I.S., member from 1900 and President in 1920; and Mr. John Bond, O.B.E., member from 1905.

Induction of New Members.

The following were inducted as new members of the Association:

H. PLATT, M.I.Struct.E. (Engineer and Manager, Gas-Works, Bolton).

F. H. G. GOODWIN, B.Sc., A.M.I E.E. (Engineer and Manager, Gas-Works, Salford).

D. E. TERRACE (Superintendent, Wavertree Works, Liverpool Gas Company).

H. H. THOMAS, B.Sc. (Chief Chemist, Liverpool Gas Company).

A. PICKARD (Acting Secretary and Manager, Knottingley Gas Company).

R. V HART (Engineer, Manager, and Secretary, Westhoughton Consumers' Gas Company).

W. J. SHELLEY (Engineer and Manager, Gas-Works, Thornton Cleveleys).

Presentation of Certificates.

The PRESIDENT said that the number of Diplomas and Certificates which had been awarded was a record for the district. In the whole of the country for Diplomas in Gas Manufacture there were six First Class and ten Second Class, and of these Manchester had secured two First Class and three Second Class. This was a very good percentage. In Higher Grade Manufacture there were 19 in the First Class and 46 in the Second Class. Manchester had 12 First Class and 20 Second Class. In regard to the Diploma for Supply there was only one in the whole country for the First Class and that was awarded to Manchester. In Higher Grade Engineering Supply there were 20 First Class and 14 Second Class. Of these Manchester secured four in the First Class and one in the Second Class. In regard to certificates in Gas Supply the total for the country was six First Class, 40 Second Class. Manchester took one First Class and four Second Class. That made a total of 20 in the First Class, and 28 in the Second Class. Withheld from 1937 there were three Higher First Class Manufacture, and three in the Second Class. With the Higher Grade Supply there were two in the Second Class. This made a total of 56.

Six Diplomas would be presented at the Autumn Meeting of The Institution of Gas Engineers, and 50 Certificates were to be presented at the Meeting that day. It was a most gratifying result, for it proved that the students in the district were alive to the fact that they must acquire all the knowledge they possibly could, and which was placed before them and made possible by the education scheme of The Institution of Gas Engineers. On behalf of the members of the Association he offered congratulations to the successful students and expressed the best wishes for their future.

A Paper entitled "Experiences of an Industrial Gas Developing Centre" was then presented by Mr. H. P. Lupton, of the Liverpool Gas Company's Industrial Department. The first part of this Paper will be found on other pages of this issue.

Juniors Visit Motor Works

On Friday, Sept. 30, members of the Wales and Monmouthshire Junior Gas Association visited the Austin Motor Works at Longbridge Birmingham. On arrival at Longbridge, the Association had an opportunty of inspecting the latest model cars in the Reception Room, after which members were entertained at lunch.

Mr. W. Welsh, on behalf of the Chairman of the Company, welcomed those present.

The Association spent an interesting 2½ hours witnessing the manufacture of various types of Austin cars, from the steel sheets to the finished article ready for dispatch.

After tea, Mr. H. V. Williams, President, suitably responded to Mr. W. Welsh and asked him to convey the gratitude of the Association to the Chairman, Lord Austin, for a most excellent and instructive visit.

The Midland Association of Gas Engineers and Managers

The Autumn General Meeting of the Midland Association of Gas Engineers and Managers was held at the Grand Hotel, Birmingham, on Thursday, Oct. 13—the PRESIDENT, Mr. Fred Davies, of Walsall, in the chair.

The minutes of the Annual and Spring General Meetings were taken as read and confirmed, and apologies for absence were reported from Presidents of kindred Associations and from a number of members.

Mr. O. S. Brettle (Engineer and Manager of the Sedgley Urban District Council Gas Department) was unanimously elected to membership of the Association, after which the PRESIDENT presented Certificates to successful students in the Higher Grade Examinations in Gas Engineering and Gas Supply, at the same time congratulating the recipients on their success.

The New President.

The PRESIDENT said that in normal circumstances their Vice-President, Mr. C. F. W. Rendle, of Redditch, would have succeeded to the chair; but for reasons which he would explain he felt unable to accept office for the time being.

Mr. RENDLE voiced his appreciation of the honour they had done him in asking him to accept office as President of the Association, but said that he was at the present time faced with a considerable problem at his works consequent upon a large consumer desiring to take more gas than the total present capacity of the plant. This would entail doubling his works in the space of twelve months, so that he felt it would be difficult for him in the circumstances to devote sufficient time to the office of President.

The PRESIDENT announced that Mr. Rendle was willing to remain as Vice-President for the ensuing year, and they had been fortunate in getting Mr. G. C. Pearson, Engineer-in-Chief to the Birmingham Gas Department, to fill the breach. He was sure they all felt tremendously indebted to Mr. Pearson for coming forward at a moment's notice in this way. He would like to propose his election to the Presidency.

Mr. H. DAVIES (Chesterfield) seconded the resolution, which was unanimously approved, and Mr. PEARSON thanked the Association for the kind way in which they had received the proposition. He would do his best to make a success of the office.

Members of the Committee were elected as follows:

H. Banks (Northampton),
A. H. Cranmer (Wolverhampton),
J. P. McCrae (Derby).

Mr. T. F. E. Rhead (Birmingham) and Mr. W. H. Reed (Warwick) were appointed Auditors for the ensuing year.

The PRESIDENT went on to refer to the resignation of Mr. J. H. Paterson from the position of Hon. Secretary and Treasurer, and said the Committee had nominated Mr. J. H. Wainwright, of Halesowen, as his successor. They were very much indebted to Mr. Wainwright for taking on this work—particularly for assisting them in a moment of emergency—and he had much pleasure in moving that his election be confirmed.

This was seconded by Mr. W. G. S. CRANMER (Willenhall) and unanimously approved. Mr. WAINWRIGHT briefly acknowledged his election and said he would do his very best in the interests of the Association.

On the proposition of Mr. T. H. POULSON (Stafford), a hearty vote of thanks was accorded to Mr. J. O. Baker, of Ludlow, for his assistance both before and since Mr. Paterson's resignation. Mr. BAKER expressed his thanks for the vote, and said he would be very pleased to do anything he could to assist the new Secretary in the future.

A Paper was then presented by Mr. H. B. Avery, of the Manchester Oxide Co., Ltd., entitled "Oxide Purification."

Oxide Purification

by

H. B. AVERY, M.Sc.Tech.

(The Manchester Oxide Company, Ltd.)

A Paper read before the Midland Association of Gas Engineers and Managers at their Autumn General Meeting held in Birmingham on Oct. 13.

In recent years a very considerable amount of study has been devoted to the removal of sulphuretted hydrogen from coal gas by the wet purification methods as opposed to the present standard practice of oxide purification.

Broadly speaking, it cannot be said that any of the wet processes show advantages over the present system for either large or small undertakings, while it is generally admitted that wet purification can only be satisfactorily carried out on a comparatively large scale. The actual control and testing necessary for successful operation of these methods require the continual services of a staff which are not available at the smaller works. Oxide purification, on the other hand, has shown itself to be equally adaptable for either large or small works.

Continental opinion is almost entirely in favour of dry purification with oxide boxes, and although a certain amount of work has been done in modifying the design and system of working, oxide purifiers of more or less conventional design, using multiple layers and divided flow of the gas stream, are in general use. Many new installations of this type have been erected in the past few years and many are still in course of erection.

With regard to this country, dry oxide purification is exclusively in use, and here again, although one of the newer types of tower purifiers has recently been erected general opinion is strongly in favour of the more conventional design of purifiers, many of which installations are in course of erection at the present time and the only striking feature is the tendency for these boxes to be somewhat deeper than the usual dimension of 6 ft. It is certain, therefore, that for many years to come the present method of gas purification in England will remain largely unaltered and that improvement will be confined to standardizing the method of working and improvement in the quality of the oxide in use.

A Chemical Engineering Process.

Dry purification may be considered as a chemical engineering process in which very unusual demands are made for high efficiency, and it is safe to say there is no other problem of this nature in which 100% efficiency is demanded by law

and obtained in practice. This efficiency, moreover, is obtained with very little difficulty, unusual troubles seldom occurring, and when once a suitable material for the local conditions has been obtained, satisfactory working is readily maintained.

In most plants where chemical operations are carried out initial troubles are expected, and it is very seldom that a new plant is erected and goes into full operation without very considerable difficulties having to be overcome. In the case of oxide purification this does not occur. A new set of boxes charged with a suitable oxide is put to work and expected to perform its duty from the first day, and seldom if ever fails to do so.

Every year gas undertakings in the British Isles consume between 100,000 and 120,000 tons of various types of hydrated oxide of iron for purification extracting between 70,000 and 80,000 tons of sulphur from the gas, and it is probably correct to say that half this quantity operates without any chemical supervision whatever.

Certain troubles in dry purification, however, do occasionally occur and these have been exhaustively studied, and the possible reactions which may give rise to these effects have been published from time to time.

In a Paper read before the Manchester District Association in October, 1931, some 35 different reactions, which are known to take place in purifiers, are given in some detail. Many of these, of course, are of comparatively theoretical interest only, and their effect on general purification is not noticed, the incidence of such reactions only being discovered by the examination of spent oxide produced. Others, however, are of a very much more serious nature, and it is of certain of these reactions that I should like to speak for a short time. To do so we will consider the case of a works where the staff find themselves faced with one of the most awkward problems of all—that is, traces of H_2S passing through the boxes. This may only represent a drop in efficiency of working of 0·01%. The position is, nevertheless, dangerous and has to be faced immediately.

It is important to appreciate the possible cause of the trouble, to take immediate steps to correct the faulty condition, and to keep in view precautions which will have to be taken to prevent a future recurrence. In the case of a set of purifiers of average capacity, containing normal active oxide, the most likely causes of failure and unsatisfactory working are:

1. Inadequate oxygen content of the gas.
2. Excessive ammonia content of the gas.
3. Inadequate ammonia content of the gas.

With regard to the first point, the theoretical requirements under ideal conditions demand the absorption of 0·5% oxygen for 1% of sulphuretted hydrogen if complete revivification in the boxes is to be obtained. Actually, this ideal condition can never be attained, as a certain amount of oxygen is absorbed in the unavoidable formation of sulphates, and it should be noted that, while 1 molecule of oxygen will fix 1 molecule of sulphur as elemental sulphur, 4 molecules are required to fix 1 of sulphur in the form of sulphate. We therefore have to face the absorption of more than 0·5% for complete reaction.

The main factor in successful working of oxide may be said to be its activity in absorbing oxygen rather than its capacity for H_2S absorption, and an adequate supply of oxygen to the boxes is therefore necessary.

When a set of purifiers becomes sluggish and dirty gas advances further forward in the gas stream, the first point to be checked is whether an adequate supply of oxygen is, in fact, available, and for this reason the admission of air to the gas stream should be under very definite control. The first consideration where a set of boxes becomes sluggish is to make certain that no alteration or restriction of the supply of air has taken place. Wherever possible, daily tests on the oxygen content of the purified and also the unpurified gas should be made.

Temperature Observation.

Observations of the temperatures are also a very useful indication in this respect, as an otherwise unexplained decrease in the average working temperatures may be due to a shortage of the oxygen supply. An increase of temperature shows very rapidly if an excessive amount of oxygen is being used. This is detrimental, as where this condition exists the activity of the oxide is enormously increased and the reaction completed owing to the rise in temperature in a very shallow layer. This may be so excessive that a hard skin of spent oxide highly charged with sulphur is formed on the surface of the layer, and back-pressure resulting from this hard layer may lead to the erroneous impression that the whole of the oxide is fully charged, when this is, in fact, not the case. Excessive oxygen may also cause an acid condition of the oxide due to excessive formation of sulphates.

Lack of oxygen is not only frequently responsible for the sluggish working of the set, but is also dangerous, particularly in the case of a very active oxide being used, when it becomes necessary to discharge a box. Lack of oxygen will have resulted in the box being very fully sulphided, and on exposure to the atmosphere considerable over-heating may take place even to the extent of the material catching fire. In order to avoid this difficulty it is always advisable to rotate the box to the fourth taker position for one or two days before the material is discharged. An active oxide should never be discharged from the first taker position where this can be avoided.

With regard to the second point—excessive ammonia—difficulties arising from this cause are probably more frequent at the present time than in former years, when the recovery of ammonia was of importance and the quantity passing the scrubbers very carefully determined. Only too frequently at the present time it is found that excessive quantities of ammonia are passing forward with the gas stream. This excessive ammonia content can cause very considerable difficulty and is frequently responsible for the appearance of slightly fouled gas at the outlet of the boxes.

The first reaction which may be considered is that which takes place between ammonia and the carbon bisulphide present in the gas, resulting in the formation of ammonium sulphocyanide and H_2S according to the following equation:

$$2NH_3 + CS_2 = NH_4CNS + H_2S.$$

This reaction is accelerated by elevated temperature and is most frequently found to take place during the summer months, when the difficulty of reducing the temperature of the gas results in increasing the quantities of ammonia passing forward into the purifiers.

Ammonia may also produce a highly acid condition of the oxide, which results in loss of activity and consequent sluggishness of the oxide. This acidity is produced indirectly by a series of reactions which are given below. The ammonia first reacts with hydrocyanic acid always present in the gas and together with the sulphur present in the oxide forms ammonium sulphocyanide. This sulphocyanide can further react with ferrous sulphide forming ferrous sulphocyanide with evolution of sulphuretted hydrogen. A similar reaction takes place with ferrous oxide.

The ferrous sulphocyanide can further react with oxygen forming the ferric salt—an extremely acid body which may cause very serious corrosion of the purifier plates if present in excess.

$$2NH_3 + HCN + S_2 + 2NH_4CNS.$$
$$2NH_4CNS + FeS = Fe(CNS)_2 + 2NH_3 + H_2S.$$
$$2NH_4CNS + FeO = Fe(CNS)_2 + 2NH_3 + H_2O.$$
$$12Fe(CNS)_2 + 3O_2 = 8Fe(CNS)_3 + 2Fe_2O_3.$$

It is thus seen that ammonia may cause the appearance of foul gas by direct reactions with compounds which are unavoidably present.

A further difficulty is frequently caused by excessive ammonia passing through the first taker box, the gas being cleaned in the second taker. If this rotation be maintained for some days a condensate will occur in the bottom of the first box which will contain a considerable concentration of ammonium sulphide. When this box in turn becomes second taker the gas leaving the bottom of the layer of oxide may be perfectly clean, but in passing over the condensed liquor in the bottom of the box may again pick up traces of H_2S. This staining may be quite persistent as the rate of decomposition of the ammonium sulphide is comparatively slow as compared with the rate at which H_2S would be driven off from an aqueous solution. When excessive quantities of ammonia are present the liquor may not have yielded all the H_2S until after the box has been rotated to last taker position and may cause staining of the gas at the outlet of the set.

In order to avoid this it is very desirable to make absolutely certain that the bottom of the boxes are thoroughly

cleaned whenever they are discharged, that a continuous drain-down is provided, and that the bottom grids are kept in good condition so that the minimum quantity of oxide falls through into the bottom of the boxes during charging where it prevents rapid draining of the liquor. It should be pointed out that such oxide, which is naturally in a wet and sodden condition, is very inactive and does not react with the sulphuretted hydrogen contained in the liquor.

Result of Excessive Ammonia.

Where for any reason excessive ammonia has been passing forward to the boxes and has resulted in the considerable formation of ammonium salts, these salts can give rise to free ammonia even when the excessive ammonia has been checked. Ammonia salts can react with ferrous sulphide or with ferrous oxide with the evolution of ammonia so that in such extreme cases the only method which can be adopted to render the oxide active and safe is washing with water to remove the soluble salts.

With regard to the third point—absence of ammonia—the difficulties due to this reason very seldom arise, but the matter is of some interest, particularly with regard to the charging of a suitable oxide for catch boxes.

It has been found that unused oxide is liable to evolve very slight traces of H_2S when clean gas is passed through it, particularly when the temperature is moderately high. It cannot be claimed that the reactions causing this have been determined, as the quantities evolved are so exceedingly minute. This trace is generally sufficient to give a very pale straw tint to lead acetate paper in several hours. It has, however, been determined that a very slight trace of free ammonia will entirely prevent this reaction taking place.

It is interesting to note that other alkalies, such as lime, caustic soda, or carbonate of soda, do not prevent this formation. For this reason it is inadvisable to charge any catch box completely with new oxide.

For many years it has been the practice in most works to mix in a proportion of spent or partly spent material, and this has resulted in a slight evolution of free ammonia which has fortunately prevented this obscure reaction taking place. Some small amount of ammonia may be said, however, to be definitely beneficial to smooth purification working, and it has been found that a concentration in the neighbourhood of 4 to 5 grains per 100 cu.ft. is ample for this purpose and where possible should not be exceeded.

To make a brief summary of the points above mentioned the oxygen admitted to the boxes should be ample for the particular oxide employed, as the variations in activity between different oxides is considerable. Concentrations of oxygen of below 0·3% are practically inoperative and may therefore be discounted, and a sufficient concentration in excess of the theoretical quantity required for the main reaction must be allowed to cover side reactions.

Ammonia should be present to the extent of 4 to 5 grains and concentrations of above this viewed with suspicion. Care should be taken to ensure the thorough cleaning of the bottom of the boxes each time they are emptied and continuous draining of the liquor from the bottom provided for.

Particular care should be taken never to discharge a box from the first taker position, as, quite apart from the danger of firing when the box is opened, the material is certain to overheat after discharge, and may then fire, with the result that the oxide becomes strongly charged with acid salts, resulting in the oxide becoming inactive and also corrosive.

The foregoing remarks cover, I believe, the most common causes of difficulties met with in oxide purification. When once appreciated they are simple, easy to overcome, and the testing involved in ensuring their control not by any means excessive.

Discussion.

The PRESIDENT (Mr. F. Davies, of Walsall), in opening the discussion, referred to the discharge of H_2S from purifier boxes due to the operation of bacteria. He put this down to the type of lightening material used in the oxide. They put several types of sawdust in wide-mouthed test-tubes, and in a few days lead acetate paper was badly stained. He asked if Mr. Avery could confirm this experience.

Mr. G. C. PEARSON (Birmingham) said that they had received a most interesting Paper from Mr. Avery, from which it was inferred that purification was one of the most simple processes on a gas-works—provided it was under efficient technical control. Purifiers unfortunately occupied a very large area and represented a considerable capital outlay. The cost of subsequent working, however, was negligible, although the process had not developed to any extent for many years beyond the improvement of mechanical arrangements; it was in layout of plant, effecting savings in handling and labour operations, where economy was possible. Mr. Avery did not refer to the working rotation of boxes, and Mr. Pearson thought it might be of interest to members to recount that many years ago the purifiers at one of their works in Birmingham were in sets of six boxes. Four of these were operated as primary boxes and were reversed in backward rotation, the clean box always going first; and it was found possible to keep at least one of these primaries clean at all times while the two remaining boxes worked as secondaries and were really called upon to do no work at all. On the few occasions that they were required to carry out duty they proved to be incapable. They thought this over, discussed the matter with the Manchester Oxide Company, and came to the conclusion that secondary boxes were really unnecessary. Connexions were therefore altered to make it possible to work the purifiers in rotation of six boxes, and each time a change in rotation was made after the set had reached the stage when two boxes only were clean. After a change when no improvement over two clean boxes took place, then a box was changed in the set, and so on. The effect of these arrangements had been to bring the whole of the purifiers into active operation and to increase the capacity of the sets. These were originally laid down for 2½ million cu.ft., whereas they now took upwards of 4 million cu.ft. each set per day. Furthermore, especially in summer time, it was possible to work oxide to a higher percentage content of sulphur—thus bringing about economy in the purchase of new oxide.

Mr. C. A. INGHAM (Cannock) said it was news to him that a clean box with catch boxes filled with new oxide could produce H_2S when purified coal gas was passed through. In connexion with Mr. Pearson's remarks, he had heard it suggested that instead of throwing the catch boxes into the rotation system a better method was to introduce another box and have two boxes always as first takers in parallel. One advantage of this was the slower travel of the gas through the oxide.

Mr. R. S. RAMSDEN (Leamington) said that one of Mr. Avery's last remarks was that particular care should be taken never to discharge the boxes from the first taker position. At Leamington they had four boxes which could not be worked in backward rotation. There were also two catch boxes. In these circumstances what modifications should be made in order to avoid discharging from the first taker position?

Suitable Temperatures.

Mr. T. H. POULSON (Stafford) asked what Mr. Avery considered a suitable temperature in the boxes. At Stafford they found 80° to 85° was good. Instead of excess moisture in the oxide they experienced the reverse. They therefore blew in live steam at the bottom of the boxes. Their boxes worked in a downward direction. They did not admit air directly to the box inlet but at the exhauster, but Mr. Poulson felt that if they did so they should not admit it at the first box. Rather should they have a system for admitting air into each box individually. They had four boxes and had worked on the same lines as Mr. Pearson for the past sixteen years. He thought, however, that one catch box might be useful.

Mr. F. C. BRIGGS (Dudley) observed that Mr. Avery had stated that oxide purification was one of those things which worked so well that they forgot all about it. The result was that they did not know very much about it. Mr. Briggs asked if it was best to rotate regularly or to leave the boxes as they were until there was a certain amount of sulphur in one box. At Dudley they had been rotating regularly, but were wondering whether they should not exercise more scientific control rather than work by rule of thumb. He also enquired as to the humidity figure. Most of them worked with the idea of getting as much sulphur in the oxide as possible before changing. If they worked oxide from fresh to a high percentage in one change they were faced with the bogey of expansion. This pressure exerted by foul oxide was an involved problem. They could not work on its voids, because when a foul purifier showed signs of cracking the gas might well be going through with very little back pressure. Mr. Briggs said he was particularly interested in this as he had been "living" with his purifiers for the past few months. They had to catch up a rapid increase in gas consumption and put new purifiers down on a site already occupied by similar plant. They could not dispense with the old plant until the new was installed, and they could not put down the new until the old were out of the way! However, they overcame the difficulty and put down four boxes 8 ft. 6 in. deep with two layers of oxide. They were going to put the gas in through the middle and work it up through one layer and down through the other. They had reversing valves so that they could also put the gas in at the top or bottom and take it out through the middle. They had pre-heaters at the entrances of each box so that they could control the temperature and humidity at the same time. They had a proper air compressor, the output of

which was measured through a meter, and they put the air in through each box. It was no use pushing air into a foul taker. They were going to have no further grids but two deep layers of oxide which could be worked up to a high degree.

Mr. W. G. S. CRANMER (Willenhall) said that some years ago he experienced considerable trouble owing to expansion with consequent cracking of side and deck plates. They strengthened the boxes with cast-iron beams. When they put down further boxes they had them constructed of steel. They did not, however, have steel bottoms, the latter being constructed of reinforced concrete. They had yet to see whether corrosion would occur. Mr. Briggs had spoken of 8 ft. 6 in.-purifiers with provision for putting the gas in through the centre. Before he decided on the last two boxes he visited works with 10-ft. boxes with provision for putting the gas in between the layers; but their experience was that the two layers did not give equal resistance to the passage of the gas, with the result that one layer became fouled before the other and the gas then passed through the other layer in the opposite direction. Mr. Cranmer said he had some bad corrosion in the covers of the first cast-iron boxes he put in. When working in a downward direction the point farthest away from the inlet corroded very badly. This indicated that there was practically no movement of the gas at that point and the foul gas lying in contact with the covers appeared to corrode very rapidly. The two purifiers put in last year were arranged so that he could work upwards or downwards by reversing the supply. They started in an upwards direction, but he eventually came to the conclusion that whatever disadvantages there might be from corrosion they were more than counteracted by the hard layer of oxide on the grids, with the result that the efficiency was not so high as when working downwards.

Mr. G. DIXON (Nottingham) said that in regard to catch boxes which were not rotated but simply left until they were required he had adopted the same procedure as Mr. Pearson. They had put all their six boxes into use and rotated the whole six, which undoubtedly gave the best service. He enquired if all six of Mr. Pearson's boxes were worked from one centre valve. If this was the case there was the possibility of a slip of foul gas through the valve when changing. He thought that this was one of the reasons why gas-works were sometimes referred to by the public in a manner in which they would not wish—due to the smell which emanated from most works. They could not get over the whole trouble, but there were many things which could be done to minimize the smell. One of the principal troubles occurred on the day they changed the purifiers.

Mr. PEARSON, replying to Mr. Dixon's question, said that they had no centre valve. Their boxes were worked in the order 1, 2, 3, 4, 5, 6 and then 6, 1, 2, 3, 4, 5—and so on.

The Author's Reply.

Mr. AVERY, replying to the discussion, said that he had no direct experience of purifier difficulties caused by thio bacteria. Most of the difficulties encountered had been explained either by the presence of ammonia or dirty liquor in the bottom of the boxes. It was general experience that catch boxes acted as condensers and very little else, and when new oxide which was an ideal absorbent was used several years without being touched the excess moisture made it impossible to maintain a working temperature with the small trace which it was called upon to treat. They, therefore, recommended that catch boxes should be charged with partly spent oxide from a working box which drained down to a constant moisture content. The best way to deal with catch boxes, however, was to make them into working boxes. With regard to the use of two primary takers instead of 4 boxes and 2 catch boxes the disadvantage was that these two boxes which always took the foul gas became unduly fouled with tar. This resulted in a somewhat sluggish working and also the production of a dirty spent oxide, the disposal of which was a matter of some difficulty. In reply to Mr. Ramsden's question regarding the emptying from the first taker position it was certainly not always possible to do this where the valves were not suitable, and special precautions should therefore be taken when boxes were worked in the forward direction on discharging. Where boxes could be rotated to the last position this should always be done. A working temperature of from 80° to 85° was a very suitable working temperature, although temperatures of 90° and even higher were occasionally worked. Temperatures above 90° should be discouraged, as the measurement was taken in the gas stream.

In some cases where temperatures below the surface of the oxide were as high as 116° the temperature measured in the gas stream would only show 76°, so that a temperature of 90° in the outlet of the gas might indicate a dangerously high temperature in the body of the oxide.

The question of side thrust was a serious one, and Mr. Avery thought it would be best answered by saying that in his opinion, if it were possible to foul the oxide to 55% sulphur in two changes this was better than fouling it to 50% in one exposure only. The 5% increase in sulphur content represented a saving of 20% on the fresh oxide used which more than covered the cost of emptying the box. The fact that no back-pressure occurred even when hardening of the oxide took place was due to the formation of a lattice structure which allowed free gas passage through the interstices of the oxide. The sulphur cemented the particles together and the sulphur layer increased in thickness, thus causing the whole mass to expand while still remaining porous.

Regarding the admission of air to each box, it was generally realized that while the material was comparatively fresh before 30% sulphur was reached the oxide in the first taker position might absorb 70% of the total oxygen absorbed. As the oxide became more spent the quantity absorbed would decrease to as low as 35% of the total absorption, so that the ability to admit air to any box at will was an advantage. If a sluggish box were placed as last taker and all the oxygen passed through this with some steaming the material could be re-activated and then put as first taker. This was a common German practice. With regard to the cracking of the side plates of the purifiers it was interesting to note that the opinion in Germany was that cast iron was unsuitable for box construction. They preferred to use steel plates, but at the same time were not in favour of welding. Mr. Avery considered that downward flow was always preferable, so that the top layer was available in case of difficulty arising due to tar, moisture, or excessive hardening. The material could be broken up without having to discharge the whole box. With regard to the difficulty of smell mentioned by Mr. Dixon, this was undoubtedly due to the tar fog and light oils passing into the purifiers. The best method of reducing the smell was to reduce these to a minimum. The smell arose from the tar and naphthalene present and was accentuated by the presence of ammonia.

A hearty vote of thanks was accorded to Mr. Avery for his Paper on the proposition of Mr. C. F. W. RENDLE (Redditch), seconded by Mr. F. C. BRIGGS (Dudley).

London and Southern Juniors

Opening Meeting

The Opening Meeting of the new session of the London and Southern District Junior Gas Association was held on Oct. 11 at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1—Mr. R. N. LEFEVRE, the retiring President, occupying the chair at the outset.

The HON ASSISTANT SECRETARY (Mr. H. J. Risby) read the minutes of the last general meeting, which were confirmed and signed.

Mr. LEFEVRE, in vacating the chair in favour of the incoming President, Mr. S. C. Waldock (Gas Light and Coke Company), remarked that he was particularly proud to be the first President of the Association to wear the Presidential Collar presented by Mr. R. J. Milbourne, whom they were delighted to have with them again on that occasion. The time had now come for him to relinquish his office, and in doing so Mr. LeFevre said that he had had a most happy year as President and he thanked the members for their support and co-operation. He then invested Mr. Waldock with the Presidential Collar and the latter took the chair.

Mr. WALDOCK, in thanking the members for the honour they had done him in electing him President, remarked that the Presidential Collar would always remind him of the dignity of the office to which they had elected him, and he expressed his appreciation of the welcome they had given him. His first duty was to make a presentation to Mr. LeFevre as a memento of his year of office and as a token of the Association's appreciation of his services. Mr. LeFevre had been a member of the Council since May, 1931, during the whole of which time they had had the benefit of his knowledge and experience.

On behalf of the members he handed Mr. LeFevre a pair of binoculars, for which the retiring President expressed his sincere appreciation.

Having reported a number of apologies for absence, the PRESIDENT took the opportunity of welcoming two new members, and went on to announce that through the kindness of Dr. J. N. Long permission had been given for the meetings of the informal discussion groups to hold their meetings at the Westminster Technical Institute. Mr. Waldock also congratulated members of the Association who had been successful in recent examinations.

Presentation of Milbourne Medal.

Mr. R. J. MILBOURNE then presented the Milbourne Silver Medal to Mr. E. W. B. Dunning and Mr. R. F. Hayman for the best technical Paper presented by a member during the previous session. Before doing so, however, he spoke of the pleasure it gave him to be with them again and his regret at not being present to hand over the Presidential Collar in person. It was a matter of great satisfaction to know that Mr. D. C. Cross had consented to undertake that duty, and he had discharged it in a manner which Mr. Milbourne could not have hoped to equal. Any feeling of elation at being elected President must be tempered with a lively appreciation of the responsibilities of the office. In asking the Council's acceptance of the Collar he felt he would be placing an additional load on the shoulders of the President; but he also felt that this small load would be easily carried without producing any material or mental strain on the bearer, while Mr. Waldock had remarked that it added dignity to the installation of incoming Presidents. Mr. Milbourne congratulated Mr. Dunning and Mr. Hayman on their Paper, which contained much valuable information.

Mr. DUNNING returned thanks for the Medal on behalf of himself and Mr. Hayman, remarking that it was especially pleasing to receive the award personally from the hands of the donor.

Mr. D. C. CROSS (President of the Southern Association of Gas Engineers and Managers), who was given a cordial welcome, congratulated Mr. Waldock on his election to the Presidency of the Association and offered him the best wishes of the Senior Association for a successful year of office. Continuing, Mr. Cross said he thought it might interest them to know that the Holmes Medal, which had been presented by the Holmes family to be awarded by The Institution of Gas Engineers to the candidate who obtained the highest number of marks in the Diploma Examination, was, after a lapse of six years, to be presented again. The first recipient after this long interval was a member of their Association—Mr. J. Malsbury.

Mr. Cross went on to say that he had been honoured in being asked to make a presentation to their retiring Hon. Secretary, Mr. F. H. G. Higton, who was giving up the office after eight years' service. Mr. Cross said he had himself been associated with the London and Southern Junior Association for twenty years and consequently knew something of its inner working. As the number of members increased so also did the work of the Secretary, who gave up a very large amount of his time for the benefit of the Association. The whole success of such an organization was dependent upon the Secretary—and so long as things were running smoothly they were apt to forget him. During the eight years that Mr. Higton had been Secretary he had raised the prestige of the Association by his work, and they wanted him to have something tangible as a mark of appreciation of his services.

The presentation took the form of a set of golf clubs, and in expressing his grateful thanks for the gift Mr. HIGTON said that during those eight years he had been permitted to meet eight Presidents, from the association of each of whom he had gained a great deal. And from all the members he had received something. The Council had honoured him by asking him to allow his name to go forward for the Junior Vice-Presidency, and while he had been unable to accept that office he wished to voice his sincere appreciation of the offer.

Mr. S. C. WALDOCK then read his Presidential Address, which was published in last week's issue of the "JOURNAL." A hearty vote of thanks was accorded to him at the conclusion on the proposition of Mr. H. W. H. BUTTERFIELD (South Suburban), seconded by Mr. F. O. HAWES (Tottenham).

MIDLAND JUNIOR GAS ASSOCIATION

Presidential Address

OF

A. W. ATTWOOD,

City of Coventry Gas Department.

THE PRESIDENT.

Mr. A. W. Attwood was educated at Bournville School and the Birmingham Technical School. He joined the staff of the Birmingham Gas Department's drawing office in 1916, being appointed to similar positions at Coventry and Birkenhead in 1921 and 1923 respectively. In 1925 he returned to the Coventry Gas Department as Chief Draughtsman, and has lately been appointed Engineering Assistant to that Undertaking. Mr. Attwood holds the City and Guilds of London Honours Certificate in Gas Engineering.

The rapid growth of the Coventry Gas Undertaking is almost phenomenal. From the time of purchase from the old Company in 1884 until the present day, the rate of increase has been 5·25% compound, rising from 185 million cu.ft. per annum to 3,040 million cu.ft. per annum for the financial year ended March 31 last. The increase is even more remarkable during recent years, having risen to the latter figure, from 2,458 million cu.ft. per annum in 1935, which gives a percentage increase of 7·4% compound over the 3-year period. This abnormal rise in the demand for gas caused some anxiety during last winter, but fortunately the peak period coincided with a spell of comparatively mild weather; otherwise the maximum productive capacity would have been taxed to its utmost.

The manufacturing plant at Foleshill Gas-Works prior to 1921 comprised horizontal retorts with an output of 4½ million cu.ft. of gas per diem, augmented by water gas plant of a capacity of 1¼ million cu.ft. per diem, making a total of 6 million cu.ft. per diem. Since then the productive capacity has been increased by the addition of two installations of Glover-West vertical retorts, and the water gas plant enlarged, making the total capacity to-day, allowing for retorts off for scurfing, 12½ million cu.ft. per diem. Our peak output was 11¾ million cu.ft. on several days last winter. In view of the foregoing remarks, it will be realized that it was essential again to extend our gas-making plant.

Before I proceed to describe the new plant which is in process of erection, I would like to mention a few of the problems that confronted the Engineer of the Coventry Undertaking. Was the extraordinary demand likely to continue or was it of a temporary nature only? In coming to a decision on this point he was governed by past experiences.

During recent years, up to the end of 1937, the industrial growth of Coventry was due to expansion of ordinary trade in the town, and it is only since that time that the new Shadow Factories have been at work, and the full effects and possibilities of their requirements will not be felt until the next financial year ends. In addition to this, the population has doubled itself in 15 years, and large housing schemes are in hand to accommodate the workers who are at present travelling from outside districts, making permanent customers for domestic consumption.

The steady growth in the number of consumers has been well maintained as the following figures show:

—	Gas Made in Thousands Cu.Ft.	Consumers.		
		Ordinary.	Prepayment.	Total.
1930	2,567,125	11,843	35,833	47,676
1932	2,349,205	11,994	40,616	52,610
1934	2,400,008	12,017	44,898	56,915
1936	2,587,819	12,368	50,600	62,968
1938	3,040,233	13,008	58,209	71,217

A satisfactory feature of recent development is that all the

new housing estates are being provided with gas for public lighting. The gas sold for this purpose shows a steady increase, which is very gratifying in these days when one hears so much talk of the superiority of electric light for this purpose.

In view of the foregoing considerations, the Engineer had no hesitation in recommending his Committee to extend the gas-making plant at Foleshill Works, and it is evident that the time is not far distant when further additions to the plant will be required.

New Carbonizing Plant.

When the last extensions were carried out in 1927 advantage was taken at that time of the fact that we had the piling machine on the site, and the foundations for the present extensions were put down.

The new installation comprises 32 Glover-West retorts 40 in./46 in. model, in 4 settings, of the latest type with the improved method of heating. It is claimed that these settings are designed to give a higher thermal efficiency by reducing loss by radiation to a minimum. This is achieved by a new method of heating in which the horizontal combustion chambers are fired from both sides of the settings—that is to say, towards the centre of the setting where a central vertical flue formed through the floors takes off the hot products of combustion. Radiation and conduction of heat from the combustion chambers are, therefore, intercepted by internal walls containing the producer gas and secondary air uptakes, and is not lost to the system. The heating of the retorts will be more uniform, and can be controlled with a greater degree of accuracy.

The installation includes a further Spencer-Bonecourt waste-heat boiler capable of raising 9,500 lb. of steam per hour at 120 lb. per sq.in. pressure, 100° F. superheat. The boiler is arranged so that it can be worked in conjunction with the two boilers installed in "B" section vertical retort house in 1927, and any two of the three boilers can be worked with one as a stand-by. This latest addition brings the total number of waste-heat boilers in completed vertical retort installation up to five. The surplus steam, after taking off the requirements for steaming the retorts, is fed into the works steam main, which is 8 in. diameter, at boiler pressure, and is able to supply the benzole plant, chemical works, and the gasholders with sufficient steam for their individual requirements. This common main is being extended, as it is anticipated that with the additional surplus steam available we shall be able to supply sufficient to the power house to drive the new turbo exhausters. The steam will be admitted to the power house system, which is 80 lb. steam pressure, through a surplus and reducing valve.

The condensers installed with the previous extension are of sufficient capacity to deal with the additional output from the new retort bench.

Two new sets of turbo exhausters, each being capable of dealing with 500,000 cu.ft. per hour, are being installed in the existing power house. These are a high speed type of machine.

The washing and scrubbing plant comprises a 6 million cu.ft. per diem Livesey washer, two 3-4 million cu.ft. per diem P & A tar extractors, and a 6 million cu.ft. per diem "Multifilm" static washer with steel overhead connexions.

The purifiers consist of a block of five boxes, each 50 ft. by 30 ft. by 6 ft. deep fitted with "Triumph" valves and "Eclipse" cover fasteners. The boxes are provided with lugs for supporting four layers of grids, but it is our intention to use only two layers of oxide at the moment. The foundations for these boxes are an expensive item, as the site varied in depth from 10 to 15 ft. below the works level, and it was desirable to have all plant on the same level. This has entailed constructing a reinforced concrete slab or raft supported at intervals on mass concrete walls built off the natural ground level, the spaces between the cross walls being filled with spoil and rammed solid with mechanical rammers.

To obviate the necessity of building a new meter house, it has been found possible to install a 150,000 cu.ft. per hour Connersville meter to deal with the gas from the new section in the existing No. 4 meter house.

All the new plant just described is now in course of construction, and I hope members will have the opportunity of inspection when they visit Foleshill Gas-Works towards the end of the session.

Actual Working Results on Glover-West Vertical Retorts.

I would like to give you now a few interesting figures relative to the vertical retort installation which is at present in operation at Foleshill Gas-Works.

The first section, referred to as "A" section, was put into operation in 1923, and consisted of 72 Glover-West 33 in. retorts in 9 settings, each retort having a nominal capacity of 2½ tons of coal per diem on non-steaming conditions.

This section was re-set in 1930, and the retorts have been pointed up and washed with a special mixture of plastic cement on two occasions since that date; the producers have also been relined twice. No other repairs have been done except the usual pointing round the top of the retorts after scurfing. These settings are still at work, five of them have been 2,340 days on actual gas making, and have, to Aug. 2, 1938, carbonized 5,253 tons of coal per retort, which is equal to 360 tons per square foot of internal retort area. It is expected that this section will continue to work until April of next year, when it will be due for a re-set. The gas made during this period averaged 83 therms per ton of coal carbonized.

The second section, referred to as "B" section, was put to work in 1927, and consisted of 40 Glover-West 40 in. retorts in 5 settings, each retort having a nominal capacity of 5 tons per diem on non-steaming conditions. "B" section was completely re-set in 1933, including the division walls, combustion chambers, repairs to producers and flues. During the period 1927-33 the coal carbonized per retort was 6,591 tons which is equal to 350 tons of coal per square foot of internal retort area, excluding the steaming chamber, and the gas produced averaged 82·6 therms per ton of coal.

The total cost of repairs on "B" section during this same period was as follows:

	Per Ton of Coal Carbonized.
	d.
Cost of re-setting	7·57
Re-lining producers and repairs to flues	0·95
Hot and cold repairs to retorts and brickwork of settings, including flue cleaning and heat regulation	1·69
Total	10·21

This figure of 10·21d. per ton of coal carbonized was computed at the end of the re-set, when the installation had been completely renovated and put into condition equal to the original settings.

"B" section is again being re-set this year after 5 years of practically continuous work, during which time the coal carbonized per retort was 6,300 tons, which is equal to 338 tons of coal per square foot of internal area. On this run up to the time of re-setting the total expenditure for hot and cold repairs to brickwork of settings and producers including flue cleaning and cost of heat regulation was 1·3d. per ton of coal carbonized. It will be seen from this figure that the costs on the maintenance of the settings are considerably lower than on the previous run when the figure for this item was 1·69d.

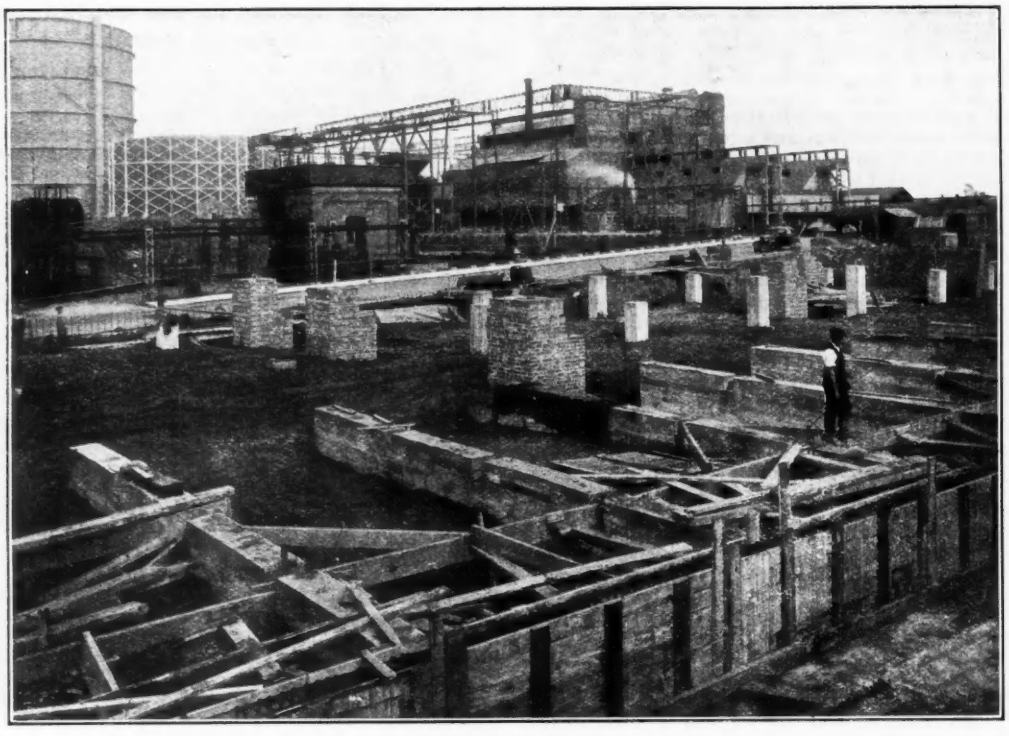
The gas made on this latter run was equal to 84·9 therms per ton of coal carbonized. The total coal carbonized on the whole vertical retort installation, both "A" and "B" sections, from 1923 until March, 1937, was 1,047,714 tons, and the gas made averaged 82·6 therms per ton, over the whole period, which includes the time of the general strike and coal stoppage, when results fell considerably. The total repair costs to brickwork on all settings over the same period, including hot and cold repairs to retorts, settings and producer, re-settings, and flue cleaning and heat regulation, was 7·72d. per ton of coal carbonized.

Horizontal Retort Benches.

I have a few notes on the life of horizontal retort settings, and in view of the recent lectures given by the Director of Refractories Research Department to this Association, these are also interesting.

The horizontal retort benches at Foleshill Works consist of 32 settings of 8 "D" shaped segmental retorts 22 in. by 16 in. by 20 ft. long, heated on the Klönne regenerator system, and working at a combustion chamber temperature of about 1,330° C.

The following are a few actual results which give a good impression of the work done on this section. Settings numbers 9, 10, and 11 were re-set in 1922, and are being re-set



Foundations for Purifiers.

again this year. Numbers 9 and 10 were actually gas-making for 3,000 days, and on slow fires for 900 days. No. 11 setting was gas-making for 3,576 days and on slow fire for 1,165 days.

Settings numbers 5, 6, and 8 were re-set in 1923 and are still at work after gas-making for 3,000 days and being under slow fires for from 1,200 to 1,400 days.

The retorts keep remarkably sound, practically no hot patching is required, and only slight repairs have been carried out between re-setting. The producers are re-lined every three years. All the work, including the re-setting, on this range is carried out by our own staff of retort setters.

The introduction of the "Grille" grate in the producers resulting in a more regular supply of good quality producer gas has no doubt contributed largely to these excellent results, but I think one of the main reasons is the great improvement in the quality of refractories manufactured to-day, thanks to the important work done by the British Refractories Research Association.

Maintenance of Structures from a Painting Viewpoint.

One consideration which has received the earnest attention of gas engineers recently has been the question of how to maintain the price of gas at the level obtaining 12 months ago. This has been most difficult on account of the increased cost of coal and labour charges. For this reason the Engineer has been looking round to see in which direction he could economize without affecting the efficiency of his plant. I mention this to lead up to the question of maintenance of structures on a gas-works, as a large amount of money can be saved in this direction.

To cite an example, the gasholders at Coventry, two at Foleshill Works erected in 1908, and one at Gas Street Works erected in 1891, are all in excellent condition, whereas I know of gasholders erected after the Foleshill holders which have already had major repairs. One reason for this was that the painting had not been given the consideration it should have received.

There is, I know, a big difference of opinion between Engineers as to which is the best priming coat for steelwork, and as far as I know there is no paint produced which will permanently prevent or destroy the corrosive action of rust.

Experience has shown at Coventry, however, that for a priming coat on steelwork and cast iron a good quality liquid red lead is the most suitable. This paint is easy to apply and spreads well, and has the advantage over red lead paint made from dry powder that it can be used at any time after standing, whereas the latter is very difficult to mix after standing, and a large quantity is often wasted. Ordinary red lead powder also hardens with keeping and becomes unusable; in addition it is also prohibited by Act of Parliament for general painting purposes.

In buying paint some people are apt to compare prices on a weight basis This is a mistake unless consideration is also given to the specific gravity, for it is obvious that with a light weight paint the volume per given weight must be more than with a heavy paint. A lighter gravity paint will spread over a greater area per gallon, and provides a more durable film than a heavier material which has a tendency to "pull" when being brushed out, with the result that it is often left on the structure in uneven layers.

As a second coat we have adopted in a number of instances in later years a silica graphite paint. This paint has one outstanding advantage, inasmuch as it does not become dead hard, and when completely dry has a rubber-like texture that will expand or contract with changes of conditions without cracking or crocodiling.

One objection which some engineers raise in connexion with the use of graphite in anti-corrosive paint is that it is carbon, and therefore a conductor of electricity, and although itself inert, will, in the presence of an electrolyte and in contact with a metal, set up a couple and stimulate corrosion. This theory has been proved incorrect. In the first place, silica graphite is not pure carbon, and secondly, when the pigment is thoroughly blended with boiled linseed oil, each particle being surrounded by a layer of oil, no current could be set up, and one could assume that insulation is effective. Actually exhaustive tests have proved that silica graphite paint is a non-conductor.

As a paint it is particularly easy to apply, with the result that a much larger area can be covered in a given time, and bearing in mind that the labour charges are always the largest

proportion of painting work, this is an important consideration. Due to the fact that it is lighter it will brush out over a greater area comparing it with other paints on a volume or weight basis.

We have structural steelwork on Foleshill Works that received liquid red lead as a primer and silica graphite natural colour paint as a finishing coat, and this has stood for over 7 years and is still in very good condition. It is claimed for this paint that it is not affected by sulphuretted hydrogen, and with this in view we are at present painting one of our purifier oxide sheds in the manner just described.

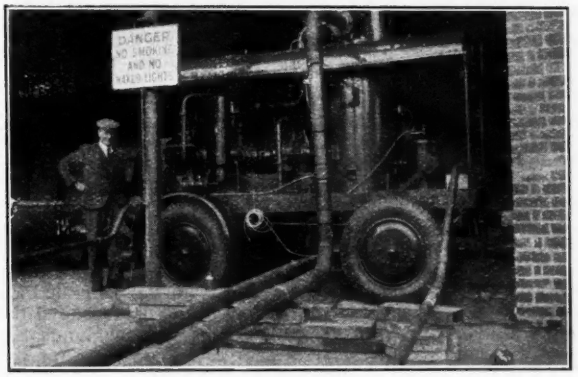
All our gasholders have been treated in this way, but with the addition of an oil gloss finishing coat paint, in a colour to suit the particular circumstances.

When it is realized that the figure for painting in an undertaking of the size of Coventry runs into a considerable sum of money per annum, it will be seen that it is a subject that is worth careful consideration.

Purging by Inert Gas.

During our last session we had a very interesting Paper by one of our members on the purging of gasholders with inert gas. Recently we have had the occasion to use this method on an old gasholder at Gas Street Works which is at present being demolished, and probably a few notes on our experience with the portable machine hired out by a well-known firm of gas-works contractors would be of interest.

The inner lift of the holder in question was 118 ft. diameter with a 6 ft. 6 in. rise of crown. The operation was commenced with about half a plate out of water, making a total of 60,000 cu.ft. of gas to be displaced. Eight offtakes or vents, six of 1½ in. bore and two of 2 in. bore tubing were arranged on the top plates, six being round the outer ring of plates and two in the centre, each being approximately 40 ft. in height and fitted with a cock at the base. A flame trap was also fitted at the top of each vent pipe as an additional safety precaution.



Inert Gas Purging Machine.

The purging machine, which is a self-contained unit, is provided with a petrol engine for driving the air and gas boosters, which are of the Connersville type and occupies no more ground space than a small motor car. The water pump also belt driven from the same engine draws water from the gasholder tank for cooling purposes, and forms a hydraulic seal above the cooling towers to prevent gases passing back to the combustion chamber from the holder in case of stoppage of the machine.

The combustion chamber on the machine, which was gas fired, took less than one hour to get up to working conditions, by which time an analysis of the inert gas being produced gave the CO_2 content as 12·6% and O_2 as 0·2%, the average CO_2 for the whole period being 12%. The temperature of the gas leaving the machine was about 63° F., and this low figure is probably due to the fact that the temperature of the cooling water taken from the tank was very low, being only 47° F.

The 4-in. bore inert gas supply was fixed on the disconnected inlet holder main, and when purging was commenced the vents on the opposite side were opened with the object of drawing the inert gas mixture across the holder. This procedure was maintained for a period, and later other vents on the outer ring were opened, but always keeping the holder bell about half a plate out of water.

The CO_2 content of the coal gas in the crown before purging was 3%, and it was nearly 6 hours after the commencement of the operation before any appreciable difference was noticed in the constitution of the gas leaving the vents. This proved that the inert gas was layering itself on top of the water, being heavier than the coal gas.

After 12 hours' purging the CO_2 content of the gas leaving the vents was about 8%, and the total time taken to reach a satisfactory composition was 26 hours, at which point the CO_2 content had reached 11%. Samples of the gas from the holder crown at all vents had been taken before this latter figure had been reached, and all had failed to ignite when tested under various conditions.

During the last hour of purging all the vent cocks had been opened and the holder bell allowed to settle down on the rest blocks. The water overflow from the tank was dammed to bring the water level to the coping, thus reducing the volume of gas in the crown to an absolute minimum.

Unfortunately, we did not have a meter on the inert gas supply and for this reason I cannot give any figure as to the quantity supplied into the holder before the purging was completed. As the machine was rated at 10,000 cu.ft. per hour we did, however, anticipate, basing our calculations on a 2 to 1 ratio, that the operation would only occupy half the time it actually did take.

For air blowing to clear the crown of inert gas, the gas booster on the machine is, by manipulating certain valves, converted into an air booster and runs in parallel with the other one. The time occupied for clearing the holder crown was only about 10 hours, at which time a satisfactory O_2 content was reached, but the blowing was continued for some time afterwards until the manholes and several top sheets were taken off to give a good vent.

With regard to costs for this operation, I would say that in our case, and it would apply in many undertakings of the same size, it was little more, if any, than purging by air. The whole of the pipes for the gas, water, and vent connexions, and the cocks, guy ropes, &c., were borrowed from stock, and the time occupied in jointing the pipes for the water and coal gas connexions was almost negligible. For air purging we should have hired an air compressor, and the cost for this would have been nearly as much as the inert gas purging machine, which was £20 per week *plus* the carriage charges which amounted to £8. It will be seen from these remarks that the additional cost for using this process was very small.

When it is considered that the work was carried out in complete safety, and obviated that uneasy feeling that is bound to exist when using air for purging, I think you will agree that inert gas for purging is to be recommended for all cases.

Scottish (Eastern) Juniors

Visit to Empire Exhibition

On Oct. 8, some forty members of the Scottish Junior Gas Association (Eastern District) visited the Empire Exhibition Glasgow, and were met at the Gas Pavilion by Mr. W. R. Drummond, Secretary of the National Gas Organizations in Scotland, and Mr. D. Lawson, Organizer of the Gas Pavilion. The party spent some time in the Gas Pavilion and then proceeded to the Palace of Engineering, visiting the Industrial Gas Exhibit of the British Gas Federation and those of Messrs. R. & A. Main, Ltd., and Ascot Gas Water Heaters, Ltd. A visit was then paid to the Glasgow Corporation Pavilion and later to the United Kingdom Pavilion.

The party then proceeded to the Garden Club where they were entertained at tea by the British Gas Federation. Mr. A. C. Rea (Perth), Past-President of the Association, introduced Mr. R. Cowie, Jnr. (Hawick), as President for the year. Mr. Cowie expressed the thanks of the Association to Mr. Rea for the very able way in which he had conducted the affairs of the Association during his year of office and asked him to accept a weather glass as a memento of this. Mr. Rea briefly replied.

Mr. Cowie, on behalf of the Association, thanked Mr. Drummond and Mr. Lawson for the very enjoyable afternoon they had arranged for them and for the hospitality extended. Mr. Drummond, on behalf of the British Gas Federation, said that they were very pleased to arrange this visit. The party then proceeded to the Tower where they ascended to the top and inspected the control room.

The Sales and Servicing of Coke Grates

by

F. J. LAWS,

Coke Sales Engineer to the Tottenham and District Gas Company.

A Paper read before the London and Counties Coke Salesmen's Circle on Oct. 5.

The importance of the coke market to gas undertakings has been stressed many times by abler pens than mine. Nevertheless I make no apologies for again referring to it and adding a few remarks, because the coke market—more correctly the gas coke market—is of fundamental importance to the members of this Circle. Without it we would not be meeting here, exchanging views and discussing our everyday problems. We are not here concerned with the preparation of the coke for this market, but rather with its sale and more particularly as affecting this contribution, the sale of domestic appliances in which coke is to be used. The coke boiler and gas-ignited coke grate are the two appliances of particular interest to us in the domestic field, and the former, having become almost a commonplace though very important fitment in the modern household, is usually incorporated in the projects and schemes of builders and architects interested in developing new housing estates within the area covered by the London and Counties Coke Association. To a less degree, the gas-ignited coke grate and range are slowly making headway.

Since the advent of the "Metro" coke grate in 1926—the forerunner of the grate as we know it to-day—many types and designs have appeared on the market, obtainable in vitreous enamel and colour finishes.

A great deal of pioneer work has been done in the popularizing of coke grates, and to this the L.C.C.A. has largely contributed. The quality of gas coke has improved considerably. Of these things we are aware and not unappreciative. People outside the Industry know of gas fires and electric fires, but a very large section of the public have never heard of a gas-ignited coke grate. Others too, having seen them remain under the impression that the gas is always burning under a coke grate when it is in use.

Recognizing that gas comes first in the Industry, we should not forget that as purveyors of heat in a smokeless form it is our duty and privilege to sell to the consumer the right form of heat in the right place and at the right price to suit his purse and the economics of the Industry.

On the coke side of our industry we have to combat competition from other solid fuels. We are frequently told that the public must be made more "smoke abatement minded." To a certain extent we have been attempting this educational effort by allowing coke grates to "sell themselves" by private recommendation as between consumers. In my view this is not enough. There is need for a wider appeal to the public by a more intensive mode of advertising—perhaps national—so that the good beginnings can lead us further into the huge field which lies before us. Mr. H. C. Smith, Chief Engineer of my Company, in his recent Presidential Address to The Institution of Gas Engineers, mentioned that approximately 215,000 coke grates have been installed during the past three or four years in the area covered by the L.C.C.A.

We are agreed, I think, that the most remunerative market for gas coke lies in the domestic field. We should also remember that upwards of 3½ million tons of saleable gas coke are produced annually by undertakings in the L.C.C.A. area, the greater proportion of which is suitable for domestic uses, not only in the independent coke boiler, but in coke grates. The majority of these grates consume from 30 to 40 cwt. of coke per annum per grate, according to circumstances. It will readily be seen that there is plenty of scope for encouraging the sales of coke grates.

Knowledge of the Fuel and the Appliance.

Before giving consideration to any particular sales methods or procedure appertaining to coke grate sales, there are two simple but every important tests with which the salesman should be familiar. The first is a periodical test of the coke in a standard type of coke grate to ascertain its behaviour and combustible qualities. The second test consists in trying out a reasonably average sample of that coke on each of the types of grates proposed to be marketed, thus learning of the behaviour of the particular appliances. Here we are largely assisted by the L.C.C.A. who hold a "watching brief" for us, ensuring that only grates of suitable design and performance are recommended. But to the salesman one must say "know your coke and know its behaviour in the appliance before attempting sales."

The *promotion* of sales is in the hands of our Sales Department which is responsible for the sale of all appliances which the Company has to offer to its consumers. Advertising, showroom displays, district canvassing, and postal circulars all emanate from this source. Suitable leaflets for use of salesmen and for distributing to consumers are also prepared in this department. In addition, the New Buildings Development Department introduce coke grates to the builders of new housing estates, and frequently, by arrangement, grates can be displayed under working conditions in show houses which are sometimes used as temporary sales offices by builders.

The Coke Grate Section of the Coke Sales Department is primarily concerned with following up enquiries sent in from the districts, by advising the consumer as to the most suitable grate to have installed, explaining what work is involved, and preparing, where necessary, estimates for that work, finally clinching the sale and arranging for the installation to be carried out. In certain cases all salesmen on the districts are able to give the consumer a quotation without the necessity for referring to the Coke Grate Section.

It should be explained that installations of coke grates on my Company's areas are done by the Company's own fitters, specially trained in the work, and during the busier winter period certain experienced contractors are employed to carry out installations. No installations are carried out by the coke grate manufacturers.

The present method of quoting for the installation of a coke grate is based essentially upon the experience gained in earlier years, when a specialized technique was deemed to be necessary. More than nine years ago the first coke grate then installed by my Company and still in use to-day required the services of a fitter and his mate for 8½ working hours. It was difficult to know what to charge the consumer for the work and to estimate how long the job would take. To make matters worse, no instructions for fixing were sent with the grate. A similar installation nowadays would require approximately one-third of the time for fixing.

The method of comparatively simplified quoting which has been evolved is based upon the following items, together with past experience of fixing costs:

Item.	Abbreviation.
1. Net selling price of grate	NSP
2. Fixed building-in charge	BI
3. Connecting to existing gas point at hearth	EP
4. Running gas supply if no existing point at hearth	RS
5. Breaking away existing firebrick and renewing	BA

It will be seen that the cash price to the consumer of any simple inset grate fixed and connected to existing gas point at the hearthside is obtained by NSP (net selling price of grate) *plus* BI (building-in charge) *plus* EP (charge for connecting to existing point at hearth). Using this result for each grate as a basic price and knowing the extra charge for RS (running gas supply) and for BA (breaking away existing firebrick and renewing) a cash price schedule can be set out to cover four types of installations, viz.:

		Cash Price.
Installation	1 NSP *plus* BI *plus* EP	= Basic price.
,,	2	= Basic price *plus* RS.
,,	3	= Basic price *plus* BA.
,,	4	= Basic price *plus* BA *plus* RS.

It will be observed that commencing with the simplest of "inset" installations connected to an existing point at the hearth a schedule of prices to the consumer can be built up to cover the running of the gas supply or the fitting of new firebricks, or both, the cash price for Installation 1 forming the basic price calculated for each make of grate, both as to size and finish. The salesman's leaflet shows on the obverse side an illustration of the type of grate, with the cash prices (basic) in each size and finish for Installation 1 only. In addition the hire-purchase terms are given. On the reverse side is a price schedule as described above, but showing both cash and hire-purchase terms. This side of the leaflet also gives brief technical data including the approximate coke consumption and the gas rate.

In addition, reference is made to what is termed Installation 5. Such installations include basket grates, certain back boiler jobs, new surrounds and mantels, removal of kitchen ranges, old fireplaces, or combination ranges. These necessitate the preparation of estimates, as they cannot be included in a fixed price schedule. Experience alone teaches the salesman how to deal with them.

Prepayment Meter Consumers.

A special option scheme to which reference was made by Mr. S. C. E. Fox in his Paper on "The Development of Coke Sales" in 1935 has been evolved for these consumers, under which payment for the coke grate is made by adjusting the meter to give a deduction of 2 cu.ft. of gas for every penny until a certain fixed sum has been paid, after which the meter is set forward again to normal. The grate is fixed first, so that the consumer has the benefit of its use while paying for it. This arrangement is limited to a certain type of grate and ordinarily entails no cash outlay by the consumer, with one exception, which occurs in the case of the removal of a kitchen range—most frequently encountered in the prepayment meter districts. Here a fixed *cash* charge is made for the removal of the range, whatever its size, and the building up of the interior. The grate is then installed with an asbestone surround and the meter adjusted as previously mentioned. Should a prepayment consumer desire a better quality finish than the standard job, he may have it by making a *cash* payment to cover the increased cost.

The brief analyses of 2,035 installations given hereunder have been extracted from records of some of the work carried out by my Company during 1937. They are indicative of the variations met with on the districts and include all sizes, types, and finishes of several makes of grate.

CASH SALES.

Installation 1		194
,, 2		129
,, 3		57
,, 4		44
,, 5 (kitchen ranges)		24
		448
Tiled surrounds included under Installation 5 =		17

HIRE PURCHASE.

Installation 1	211
,, 2	231
,, 3	23
,, 4	60
,, 5 (kitchen ranges)	36
	561
Tiled surrounds included under Installation 5 =	24

PREPAYMENT METER OPTION.*

Installation 1	110
,, 2	488
,, 3	49
,, 4	232
,, 5 (kitchen ranges)	147
	1,026
Total number of grates	2,035
Number of above grates fitted to back boilers =	593

It will be noted that included in the above are tiled surrounds and back boilers.

Tiled Suites.—When an old fireplace or kitchen range is to be removed the consumer may wish to choose a suitable tiled suite to be installed with the coke grate. For this purpose the coke grate salesman has a suitable catalogue and sample tiles or, alternatively, the consumer may be invited to choose a suite at the showrooms of the local suppliers. A complete estimate for carrying out the whole installation is then prepared.

Back-Boiler.—Special caution must be observed when quoting for the installation of a coke grate adapted to an existing back-boiler in order to avoid the possibility of being charged by the consumer with having "damaged the hot water system which was satisfactory before you fixed the grate." Tactful questions should elicit the information as to the age of the boiler and its practical efficiency as a water heater. An examination of the connexions of the hot water system, too, will sometimes give an indication of its merits. An observation of its behaviour under the old coal-fired conditions would be useful although this is not always feasible. In case of doubt, it would be better to suggest that a new boiler be fitted, and should this be acceded to, the flow and return connexions must be examined to ascertain the amount of furring or corrosion that has occurred. Do not guarantee hot water with a coke grate fitted to an existing back-boiler without a safeguarding proviso.

After Sales Service.

A consumer expects to receive a reasonable service after sales. Although each grate is sent out with detailed working instructions, one of the first calls upon this service is to give a demonstration or verbal instructions. In the case of back-boiler installations, it is advisable to call and adjust the flue opening under the boiler to suit the chimney pull.

It is usual to give reasonable free service for both cash and hire-purchase installations. The service must be governed by conditions under which the grate is being used.

When obvious signs of abuse of the appliance are apparent, it is not unreasonable to ask the consumer to pay the whole or part of the cost of renewing worn or broken parts of the grate. Beyond the first year which is a more or less "unwritten guarantee period," consumers expect and receive the general service which my Company accords to all its consumers.

For those grates installed under the prepayment meter option scheme, the service is the same as for other installations, except that on some occasions, such as when a consumer vacates the premises before liquidation of the costs of the grate, it may be necessary to overhaul the appliance to induce an incoming tenant to continue under this scheme. In such cases a new option contract must be signed by the new consumer. Should a consumer vacate one house for another on the Company's area it may be practicable to remove the grate and install it at the new address, at a small charge to the consumer.

Town Councils are gradually showing more interest in coke grates for inclusion in their housing schemes. This appears to be a direct result of efforts made by salesmen to obtain the interest of tenants of older Council estates equipped with coal-fired kitchen ranges. Since no coke grate is installed without sanction from the owner of the property, the tenant must obtain permission from the proper authority. Here a bold offer of service from a different angle can be of great assistance—namely, to agree with the Council to remove the coke grate and re-install the old kitchen range should an incoming tenant not wish to continue with the use of the coke grate. It is significant, however, that this form of service has not been called upon.

A card index record is kept of all grates fixed by the Department, giving brief but sufficient particulars to enable any queries raised to be quickly investigated. A separate card is allotted to each address where an enquiry has been followed up so that the state or development of each enquiry can be watched until the sale is effected. On the back of each card is entered a repair and service record.

Discussion.

Opening the discussion, Mr. W. L. Boon (Manager of the L.C.C.A.) explained the advertising policy of the Association, whereby they were intending to advertise coke on an extensive scale during the coming heating session. Hitherto, funds had not been available for any extensive scheme; what had been available had been expended in the production of brochures and on development work. Furthermore, the amount of coke available of

* Although not applicable so far as the ordinary price schedule is concerned, this anaylsis is given to show the range of installations which are covered under the option scheme.

a suitable character for use in the open grate had been limited. Previous policy had therefore been decided from that point of view. It was no use undertaking a large advertising campaign unless the coke supply was assured and adequate to meet any increased demand. Recently, however, the position had changed, and an extensive scheme of advertising had been decided upon. The scheme, scheduled to commence in September last, had been postponed as a result of the international crisis, but would probably be resumed in the near future. It comprised a considerable outlay on advertising domestic appliances, dealing mainly with the open coke fire. In this connexion they had invented a symbol in "New King Coke." Knowing how Mr. Therm had succeeded, they hoped "New King Coke" would be equally popular. Four pamphlets had been prepared for distribution through the Gas Industry, and the merchants and factors. Already very large numbers had been ordered. In addition, there were three posters and a display, all depicting "New King Coke" with suitable verses in humorous vein. Many thousands of these posters had so far been ordered. Judging by the demand to date, the campaign showed every indication of being a success. There was at present a considerably increased production of coke throughout the country; within the L.C.C.A. area, they would require to find more room for coke produced outside the area. The advertising campaign would help in this respect.

The campaign had also been designed to bring in the distributors. Coke sales could not be expected to increase substantially unless the distributors themselves were interested; they had not been interested hitherto in coke fires because they had not been able to install coke grates, with the result that when the consumer wished to change to coke he went to the gas undertaking, and the distributor felt that he had lost some business. That position was now changed, and when a consumer changed over from coal to coke it was the business of the producer to see that the distributor did not lose his business. Coke salesmen should be helpful to the merchant from this viewpoint.

Referring to Mr. Laws' Paper, Mr. Boon asked for further interpretation of the Author's statement that hot water should not be guaranteed with a coke grate fitted to a back boiler, without a safeguarding proviso. He assumed this proviso was consequent upon the state of the existing boiler, and not upon any inadequacy of the back boiler.

Mr. Laws pointed to the danger of a salesman promising a more efficient hot water supply from a back boiler without first ascertaining the condition of such existing pipes and fittings, which would again be used in the new installation. If the boiler installation was in reasonably good condition previously, then coke would provide an ample supply of hot water.

Specially Trained Fitters.

Mr. Laws stated that the staff for the fitting of coke grates were not gas fitters, but specially trained men. Regarding the number of "returns" under hire-purchase and prepayment option schemes, or due to the removal of tenants before the payments were completed, he said this was a difficult point, though it was usually satisfactorily dealt with as time went along. Incoming tenants could usually be persuaded to continue the scheme. If not, and if the grate was of the simple inset type, it might be taken away. If, however, the Company had installed the grate at the expense of removing an old kitchen range they endeavoured to get the tenant to continue the payments under a new contract. Should the grate have to be removed it could be re-conditioned sufficiently for it to be put out again under an option scheme. It could be pointed out to landlords that the grate increased the value of the property. Alternatively, the landlord might be persuaded to retain the fire as his property for a cash sum down. Any case must always be judged on its merits. The actual number of returns were found in practice to be very few.

Asked what was meant by the general service which his Company gave, Mr. Laws observed that the servicing to which he referred generally consisted of adjusting the lighting-up burner. Attention to the firebricks was not included in the maintenance scheme. When the grate was newly installed by the Company they could guarantee it for one year. When a new owner took over a grate which had been in use for several years they were prepared to adjust the burner, cement the firebricks, adjust the flue openings, and, in some instances, re-set the grate—provided they felt that coke would be used afterwards.

Another speaker pointed out that in some cases, after the initial guarantee period had elapsed, the grate was stated to be giving less satisfaction. There should be some system of getting in touch with all users of coke grates, either by a periodical service call or by means of a post-card asking if the grate was still giving satisfaction.

Replying, Mr. Laws said his Company made special service calls to inspect coke grates in certain instances. In the case of coke boilers they sent out cards asking if they were functioning satisfactorily. All appliances installed, whether for gas or coke, were followed up by cards asking the consumer to state if they were satisfactory. If cards were not returned then enquiries were made. Continuing, Mr. Laws stated his Company could ascertain when a consumer ceased to order coke, and took steps to find out the reason. They did not attempt to obtain coke business which was already in the hands of merchants.

All installations by contractors were automatically followed up by the Company's representatives; they did not, however, find it necessary to follow up jobs done during the busy season by their own fitters, since they gave the necessary instructions to consumers. A card of instruction was left with each new installation. A tear-off slip sent to consumers along with accounts or other literature, asking them to report any trouble immediately, was suggested as a means of keeping in touch with consumers.

Suitability of Different Cokes.

The question of the relative suitability of the types of coke supplied was raised by several members. Mr. Laws said that his Company sent out continuous vertical coke and horizontal coke. The latter contained slightly more volatile matter. They had tested both types of coke by finding the quantity of gas required for ignition, the quantity of coke the grate would contain, and how long the coke took to draw through and make a good fire. Other characteristics of the coke were normal and there was very little trouble due to the coke itself. C.A.B. tests were not considered necessary. The view was taken that intermittent vertical coke was unsuitable for open coke fires, but that it might be rendered suitable. There were some consumers who asked particularly for intermittent vertical coke because they said it lasted longer, although it took longer to ignite. When the fire went out it was found that intermittent coke left a good deal of unburnt fuel in the grate.

In giving the figure of 3½ million tons of salable gas coke, Mr. Laws said he made a note of all the undertakings in the L.C.C.A. area and the type of coke supplied. Intermittent vertical coke was made by only a very few undertakings. Mr. Boon confirmed that the bulk of coke produced in the L.C.C.A. area was from continuous vertical and horizontal retorts, and he did not know of any undertakings which made a practice of sending out intermittent vertical coke for open fires. If there were any, they were going to have trouble. The desirability of consumers being supplied with the same type of coke in all deliveries was also stressed.

The question of a good fire cement was discussed, and Mr. Laws said that "Onx" cement was satisfactory. Good refractories were provided by the makers of certain grates, but they did not always use them. Consumers could have the better quality refractories at an extra charge. It was emphasized that they did not want people to think coke grates only lasted, say, for one year. They would last for many years without trouble.

Mr. Laws stated that no coke grates were installed without the consent of the landlord of the property. One Council made the stipulation that in fitting coke grates there should be no interference with the water heating system where such existed. It was necessary for the tenant to obtain the Council's signature before the Company proceeded with any work involving alterations of the boiler system. The life of an asbestone surround depended on how it was fixed. The makers would offer to mould the sheets if desired, but it was found adequate to cut the sheets first and fit them in three separate pieces round the grate, when they would last a lifetime. Otherwise, there was a danger of fracture.

Mr. Laws did not see any point in making consumers contract to use the Company's coke. Many people obtained their coke from other sources. So long as they were using gas coke the Company had achieved what it set out to do. They must remember that under the option scheme, extending over two or three years, the consumer would have burnt some £17 or £18 worth of gas by the time the grate was finally paid for. But they must be careful not to extend the system of deductions through the meter too far, for it might be found that large consumers would install two or three coke grates under this system. The limit of 3 cu.ft. was the most that could be deducted through the meter per penny. Anything involving a greater deduction had to be paid for in cash, for they found their electrical competitors making capital out of the high price consumers were paying for gas.

Questioned as to whether his Company undertook the de-scaling of coke boilers, Mr. Laws replied in the negative. If the Company experienced any difficulty in this connexion they would probably get their own contractors to deal with the matter.

The average chimney throat, said Mr. Laws, in reply to another speaker, was incorrectly designed and required attending to before a coke fire would burn satisfactorily. The use of blowers for coke grates was also referred to, and mention was made of various types available. They were suitable for use where no gas supply was available for ignition, though they also had the effect of reducing the amount of gas required for ignition. They were not advisable, however, for general use. One type consisted of a fine wire mesh finished in a bronze heat-resisting paint, with handle. On an L.C.C. estate the adoption of grates fitted with blowers had resulted in the amount of gas used for ignition being considerably reduced.

EXPERIENCES OF

by H. P. LUPTON,
of the Liverpool Gas Company.

A Gas Development Centre

A Paper read before the Manchester Association of Gas Engineers at their General Meeting held in Manchester on Friday, Oct. 14.

In 1931, the Liverpool Gas Company decided that as some enquiries were being received which were of a nature altogether outside the experience of the domestic sales staff, there was scope for a new department on the sales side. A small showroom, some 750 sq.ft. in floor area, was fitted with a gas-fired central heating system and equipped with a few typical industrial and commercial appliances. The Author of the present Paper, because he had had an engineering and chemical training and had had some experience on the district, was placed in charge. The first year's experience was a heart-breaking one. Week by week a number of letters were sent out to firms in the city stating that the representative of the Company would call to discuss the use of gas and the modern methods of its application.

In many cases the management refused to see that there was any future for gas. The writer was told in no unmeasured terms that he was wasting his time. At the close of the first year there was very little to show in the way of orders and it seemed as though the new department would be a failure. But the visits had evidently made some impression, as an occasional visitor began to call at the industrial showroom and requests for an interview were received. Some of the enquiries were quite outside the experience of the writer and, in an endeavour to satisfy the client, help was sought from the B.C.G.A., from several of the large gas undertakings, and from manufacturers.

To some of the problems a solution was forthcoming from the above sources, but on occasion either no help was received or a long interval elapsed between the commencement of the enquiry and the production of a suitable solution. In any case it could not be expected that the large companies could spare their staff to solve the difficulties of other gas undertakings.

The opportunities for gas in industry and the lack first of a general effort to seize these opportunities and secondly of an ability to utilize these led to a proposal, in 1933, to establish Gas Development Centres. In a Paper before the Southern Association of Gas Engineers and Managers at the Autumn General Meeting in 1934, Mr. Dieterichs described the purpose of the Centre Scheme in the following words: "The Centre Scheme is designed to organize the interchange and distribution of information on a sound contributory basis, and make available all existing knowledge and experience, and also to co-ordinate policy. In addition, it is intended to enable the smaller undertakings to use the Centres in an advisory capacity to assist in dealing with any problems which may arise. This assistance is often desirable because, unlike domestic appliances, industrial and commercial plant is rarely standardized and most problems require the personal attention of an experienced man."

Originally it had been intended to establish one Central Information Bureau, but it was later decided to recommend the formation of a manageable number of district centres to cover the whole country. This recommendation was taken up in various parts of the country and a number of Centres were formed. In most cases, a large gas undertaking sponsored the formation and provided the staff and showroom. The services which it was suggested a Centre might provide will be familiar to many of you, but they might be summarized as follows:

(1) To equip and maintain a demonstration room for the display of typical equipment and for investigation work.

(2) To provide an efficient technical staff which should be at the disposal of member undertakings.

(3) To supply, on request, information relating to industrial and commercial gas problems.

(4) To publish reports on problems examined and on orders obtained; and to furnish data on new utilization methods and on the economic aspects of gas and other fuels.

Soon after the scheme for regional centres had been recommended, it was suggested that Manchester and Liverpool would form suitable headquarters for the north-west areas of the country. The Liverpool Gas Company immediately invited all the gas undertakings in the area of West Lancashire, West Cheshire, and North Wales to express their views regarding the formation of a Centre at Liverpool. From the undertakings which displayed a keenness for the idea, a Committee was elected to work in conjunction with the Liverpool Gas Company.

In the meantime, Manchester had prepared a Memorandum setting forth the duties and functions of a Centre and laying down suggestions for the financial agreements between a Centre and its members. This Memorandum, with slight modifications, was approved by the Directors of the Liverpool Gas Company and by the Committee. A copy was then sent to all gas undertakings in the area.

The Liverpool Scheme.

Undertakings representing 65·4% of the total gas sales of the area approved the scheme and signified their intention to subscribe, and it was considered that this response was sufficiently enthusiastic to warrant the formation of the Centre. Since that time there have been numerous additions to membership, and this now represents 76% of the total gas sales of the area, the actual number of members being 27. A committee of ten, elected annually by the members, now meets quarterly to discuss with representatives of the Liverpool Gas Company the affairs of the Centre. Once a quarter a meeting is held of members of the staff of subscribing members and between 30 and 40 representatives are usually present. The meeting is informed of the latest news regarding the activities of the various Centres and of the Industrial Gas Centres Committee. The various reports issued during the quarter are discussed and members report any difficulties or unusual experiences. The meetings have created considerable enthusiasm among the staff.

Each quarter the members submit to the Centre a report on the enquiries received during the quarter with a brief summary of the present position. Where orders have been obtained, the capital cost, hourly gas consumption, type of appliance, and scale of charge for gas are given. If orders have been lost to some other fuel, the reason for the loss is given. The Centre combines these reports into one section of its own report. This generally contains five special articles on some gas problem investigated during the quarter or on some installation of special interest or on some new appliance. After approval by the Committee, two copies of the report are sent to each subscribing member and one copy is forwarded to the Information Bureau. Three other Centres regularly issued reports, and copies were sent to each Centre.

Recently, in order to take in all the Centres, now ten in number, and that reports should be uniform in lay-out, the Industrial Gas Centres Committee decided to publish a National Quarterly Report in lieu of the Centre Reports. The first number was issued in March of this year, and its contents were as follows:

Introduction.
Precautions to be observed in connexion with metal spraying.
Gas water heating for swimming pools and baths.
Neutral atmosphere generating plant.
Heating resin and spirit pans.

The manufacture of laminated springs for motor vehicles.
Large scale bread baking.
Conversion of small baker's oven from coke to gas firing.
Central heating and hot water supply installation at an aeroplane works.
"Teatomaton" tea brewer.

This National Report is designed to deal with the activities and growth of the Centre organization; the more important decisions made by the Industrial Gas Centres Committee and its sub-committees; negotiations with industrial gas equipment makers; industrial gas exhibits; new or interesting industrial or commercial gas installations; and in general with all matters which it is felt will help members to advance the sales of gas to the various trades.

Members of the Liverpool Centre receive a copy of the new report although the Centre Report has not been discontinued.

The participation of Liverpool in the Centre scheme immediately helped the new industrial department of the Company. The Information Bureau issued a set of filing cards containing valuable data. The Centres Committee issued a Classification Scheme which allocated sections to the various operations in industry and commerce which could utilize gas. The Information Bureau then issued a further set of cards covering the known information on the various sections. Much of the information was of a type which had not been available or known to the department and it was soon being used.

When it had been agreed to form a Centre at Liverpool, the Gas Company considered that the small industrial showroom was altogether inadequate for the requirements of the new arrangement. New showrooms were therefore designed and these had a floor space of approximately 3,000 sq.ft. All equipment displayed was connected up to an adequate gas supply and to an air supply where necessary. The showroom was fitted out with its own fan and booster and with a supply of D.C. current taken from the generating plant of the Gas Company. The new showrooms were officially opened on Oct. 16, 1934, by Dr. E. L. Burgin, M.P., then the Parliamentary Secretary to the Board of Trade. A booklet was issued to commemorate the occasion, containing illustrations and brief descriptions of the appliances on show. This booklet was widely broadcast and enquiries are still being received for copies.

New Showrooms.

The new showrooms were a great attraction to architects, heating engineers, managers of catering establishments, and to numerous consumers in the areas supplied by the various members of the Centre. The actual demonstration of the various appliances proved of great value when discussing enquiries with interested parties. The floor space allowed of the lay-out of additional plant loaned by manufacturers to indicate the type of plant used by various trades and numerous exhibitions were staged. In one year, three exhibitions were arranged, these being for (1) dairy equipment, (2) bakers, confectioners, and butchers, (3) space heating. For each of these displays manufacturers of equipment willingly loaned appliances and heartily co-operated with the Centre to make the exhibition as representative and as up-to-date as possible. As a result of one of these exhibitions, one member undertaking secured orders for equipment valued at over £1,500.

The removal of the Head Offices of the Liverpool Gas Company late in 1937 from Duke Street to new premises at Radiant House, Bold Street, left vacant the domestic appliance showrooms. These quarters have now been taken over by the industrial department of the Company and are available to members of the Centre. The lay-out of a section of the new industrial showroom is shown in Fig. 1. The floor area now occupied by the department is 6,350 sq.ft., or eight times that occupied in 1931. Part of the old demonstration rooms are still used for furnace work, for experimental work, and for exhibitions of engineering plant, gas-fired central heating, and steam raising plant, &c.

Showrooms where demonstrations can be made are undoubtedly of great value. The number of times the expression "I didn't know that gas could do that" has been heard in the Centre Showrooms from people who would have been expected to be acquainted with modern methods would surprise many a gas engineer. Only in August of this year the engineer of a well-known firm of chemical plant engineers expressed surprise when he was shown a gas-fired steam boiler plant capable of an evaporation of 3,000 lb. of steam per hour. He explained that he had understood that boilers of 200 lb. evaporation were about the limit for gas-fired plant. The lighting-up and shutting-down of a thermostatically controlled gas-fired unit air heater has been a source of great interest to architects, to quite a few heating engineers, and to the general engineer. Because the industrial staff of gas undertakings know of these things, it is frequently taken for granted that the industrial world knows of them also. This is unfortunately not the case and the industrial gas salesman will find that considerable ignorance concerning the possibilities of gas still persists among those consumers on his area who only receive a very occasional visit.

Enquiries Dealt With.

It is now proposed to describe briefly some of the enquiries which have been dealt with by the Centre on behalf of its members. It is proposed to set out the original enquiry and then to describe the action taken by the Centre. It must be understood that each undertaking is continually sending in enquiries and that the selection now made has been chosen with a view to showing the wide range of subjects covered. Some of the most important enquiries have dealt with confidential processes and have not, therefore, been mentioned here.

Fig. 1

(1) We have for some time been trying to interest a local engineering firm in the use of gas for rivet heating. The management is sceptical and we cannot make headway. Can a member of the Centre staff accompany our representative if an interview is arranged?

A Centre representative visited the firm and finally persuaded the works engineer to send his foreman to the Centre Demonstration Room and to send a bag of rivets for test in a gas-fired rivet furnace. The demonstration took place. Gas consumption, time of heating up from cold, number of rivets heated in a given time, and the formation of scale, if any, were noted and reported back to the firm. A few days later the works engineer, accompanied by two of his staff, visited the Centre and asked for a demonstration of the furnace.

In a very short time the gas undertaking asked for the loan of the rivet heater. The firm tried this out on their site and ultimately installed six heaters of a larger size (fig. 2). Compared with the original coke-fired furnaces the gas furnaces save a large amount of space. It is reported that gas is costing £1 6s. per week against £4 previously for coke and labour. The rivet gangs, who are paid on output, are highly delighted.

(1A) A firm requires a quicker and cheaper method for drying the interior of SO_2 bottles after the empties have

been washed out with water. They have tried hot air unsuccessfully and now heat the bottles or cylinders in a furnace.

Two cylinders were sent to the Centre. It was decided to try hot air drying and a jet from a gas-fired experimental air heater was led into one of the bottles. The test was not a success. Various positions of the jet within the inverted bottle were tried and it was discovered that when the jet was fixed just within the bottle neck, drying was much more successful. Representatives of the firm witnessed the experiments and finally gave the member undertaking an order for a gas-fired air heater having an hourly gas consumption of 400 cu.ft. The firm reports complete satisfaction, as bottles are now dried in a much shorter time and the cost is considerably reduced.

(2) We have an enquiry for a large hot closet. As we do not stock anything suitable and are not aware of any firm in the district which has an appliance similar to that required, and our consumer wishes to inspect a hot closet before making a decision, we shall be obliged if the Centre will deal with the enquiry.

An appointment was made for the consumer to visit the Centre Showrooms. Various hot-cupboards were shown and an order was obtained.

(3) A local firm is extending its varnish plant. The present plant is coke-fired. Can we make a good case for gas?

This member was sent a summary of test figures from the Centre file. This so interested the firm that they rang up the Centre direct and asked for an interview. At the interview various matters connected with varnish manufacture were discussed and types of burner equipment were shown in operation.

The Centre then arranged for representatives of the firm to visit manufacturers of the plant. Some time later the member undertaking wrote to say that the firm had placed an order for two furnaces.

(4) I have a request from a local typewriter repairing firm for a special gas-operated jet for soldering type, &c. Have you any record of such an appliance?

The Centre had no record nor could any suitable information regarding a special burner be obtained. The matter was discussed with the staff of the shops of the Liverpool Gas Company and finally a burner was designed. A specimen was submitted to the rapair firm, who suggested certain minor alterations. The manager of the firm spoke very highly of the final burner and stated that the burner met a long felt want and that it should sell in its hundreds to typewriter firms.

The Centre made enquiries locally and found that typewriter repair firms were using methylated spirit lamps which were smoky and were costing at least 1d. per hour. The new burner consumed 2 cu.ft. of gas per hour and gave a cleaner and more convenient flame. Other members took up this burner and found that it enabled them to install a gas supply in premises which had previously been without.

(5) We have been asked to put forward a scheme for the drying on a large scale of roof slates. These slates will then be treated with a colour preparation. What can be done?

The Centre asked for a small consignment of slates. Various methods were tried for the drying of these slates and finally a small scale oven conveyor furnace was designed through which hot air was circulated *contra* flow to the flow of the slates. Experiments were also made to find the best method of colouring the slates and drying them. Finally the member undertaking secured the order for gas supply to a full scale conveyor oven plant capable of drying 45 superficial feet of slate per minute, and of consuming 1,000 cu.ft. of gas per hour.

(6) Can you discuss with representatives of a cooked meat firm an appliance suitable for crisping the surface of boiled porks and hams?

The Centre had previously had some experience of this type of problem and had experimented with grillers, oven furnaces, and blow-pipes. A radiant heat salamander had been found to give excellent results. The firm was invited to bring to the Centre a number of legs of pork for experiment. After some adjustment of the position of the supporting trays and of the time of exposure to the radiant rays, a satisfactory surface effect was produced on the porks. Our member has secured an order for a salamander which has been modified to meet the requirements of the firm.

(7) We have an enquiry for converting a coke-fired double-deck baker's oven to gas. Present coke consumption is 15 cwt. per week at 32s. per ton. The oven is 9 ft. 6 in. by 7 ft. 6 in. and the throughput is 3 sacks of bread made by night and smalls are made more or less all day A member of the staff will be calling at the Centre to discuss the question of conversion and comparative costs.

The representative called and the reports on conversions made elsewhere together with details of running costs were

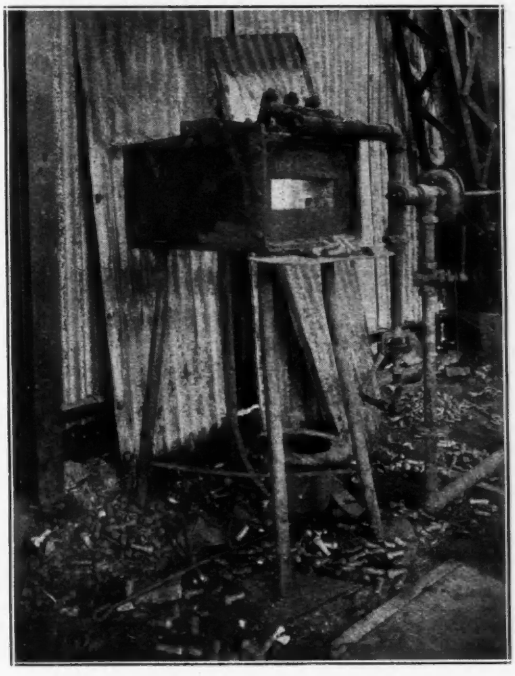


Fig. 2.

One of six rivet heating furnaces. Consumption—900 cu.ft. per hr.

discussed. In one case the following figures had been obtained:

Weekly coal consumption for two ovens	8 cwt.
Cost at 45s. per ton..	18s.
Weekly gas consumption (after conversion)	52·4 therms
Cost at 6·6d. per therm	28s. 9d.

The baker had been entirely satisfied with the conversion and felt that the extra cost of fuel was amply offset by the saving in labour, by the cleanliness in the bakehouse, by the saving of fuel storage space and of space for the accumulation of ash, &c.

It was explained that for bread baking the fuel charge must be low and business would not, as a rule, be obtained at a price which exceeded 4½d. per therm.

In a recent case where a confectioner had installed a gas-fired 6 ft. × 4 ft. two-deck oven in place of a coke-fired oven the owner stated that in addition to the advantages of ease of control and saving in time and labour he had found that the bakery walls kept clean for at least double the time than when coke was used and shelves had only to be dusted once per week instead of every alternate day. Half an hour saved per day represents 3s. per week.

The member was advised not to proceed with the enquiry unless his price for night baking could be modified. In connexion with this question of the conversion of ovens, it might be mentioned that the Liverpool Gas Company has

recently converted two 2-deck steam tube Peel ovens from oil-firing to gas. The gas burners fire directly into the oven and the results to date are very satisfactory. Fuller details of the burner equipment, flue arrangement, and gas consumption will be published in an issue of the Industrial Centres National Report.

(8) The medical officer in charge of an Institution is interested in the sterilization of milk containers. These latter consist of eight 12-gallon, four 10-gallon and six 6-gallon milk kits, 14 milking pails, and 5 other pails. If you have any installation in or about Liverpool of a size corresponding to that required by the above articles, can you arrange for us to visit along with our prospective customers? The doctor is most anxious to see a working installation and the lay-out.

The Centre arranged for three visits to be made. These visits resulted in a request for a quotation for a 5 ft. × 5 ft. × 5 ft. self-contained sterilizing chest and for a 50-gallon lagged storage set. The member was successful in obtaining the order (fig. 3).

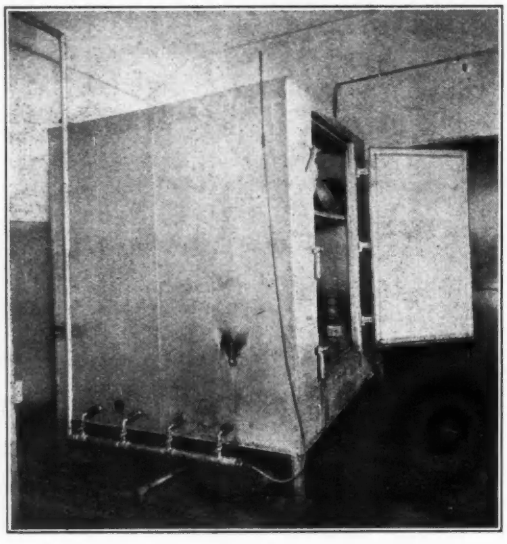


Fig. 3.

INSTITUTION FARM DAIRY.

Washing and Sterilization of Dairy Equipment.

Self-contained gas-heated sterilizing chest, 5 ft. × 5 ft. × 5 ft. internal dimensions, capable of dealing with the following at one operation:

8–12 gallon milk kits .. 4–10 gallon milk kits
6– 6 ,, ,, ,, .. 19 milk pails

With full load in chest a temperature of 210° F. is reached in 25 minutes. Gas rate 250 cu.ft. per hr.

Some time ago the member reported that the plant had been in use every day for the past year and that the average daily gas consumption of the combined plants had been 500 cu.ft.

(9) This particular member gave the Centre some rather awkward problems and a list is therefore given of some of the enquiries.

(*a*) Can stearic acid be heated in a direct heated pan without discoloration? What type of burner do you recommend?

(*b*) Supply details of an automatic electric plant and of any gas operated generating plant for lighting.

(*c*) Send particulars of various types of distilled water appliances.

(*d*) A gas-operated pump required for lifting water from a well in a greenhouse.

(*e*) Details required of kilns suitable for firing pottery in an art school.

(*f*) How can petrol engines be converted to run on gas?

(*g*) What type of furnace is suitable for the heating of springs? Give details and costs.

(*h*) Is there a gas-operated machine for milking cows?

(*i*) Is there a gas-heated loaf-wrapping machine? If so, please give the names of makers.

(10) In the area supplied by this member there have been a considerable number of central heating and steam raising enquiries, and during the last two years boiler plant has been installed with an output of 33 million B.Th.U. per hr. All the central heating plant has been installed by local heating engineers, with whom the gas company is on the friendliest of terms. Many of the original enquiries have been received by the company, whose industrial representative has proceeded to discuss the enquiry with the consumer. A heating engineer has then been asked to quote and to inform the gas company concerning the size of the boiler. The Company has then quoted for the necessary gas supply. When an order has been completed, the industrial representative has seen that the boiler and any controls were working correctly, and then an order has been obtained from the consumer for maintenance, a charge of 5s. being made for each of two visits during a heating season.

The following table gives details concerning a number of installations. It was felt that the running costs, which are actual charges against the consumer and are obtained direct from the meter readings, as each central heating installation has its own meter, would be helpful as a guide for other undertakings. The price charged for gas was 4½d. per therm for the first 3,000 therms per quarter, and 3½d. per therm for all in excess. There was a standing charge of £4 per annum. To benefit by this special scale a consumer must use at least 1,000 therms per annum. On the average installation it has been found that the running costs on gas are approximately 40% in excess of previous costs on coke (only in installations where the coke boiler had received special supervision have the running costs on gas been as much as double those on the previous coke installation).

Type of Premises.	Type of Boiler.	Rating B.Th.U./ Min.	Approx. Hrs. per Week.	Therms/ Annum.	Cost/ Annum.	Remarks.
					£ s.	
House ..	1 GB.3	49,500	112	1,220	26 18	
House ..	1 GB.3	49,500	112	786	22 15	Minimum cons. is 1,000 therms.
Flats ..	1 GB.3	49,500	168	1,710	36 0	1 GB.4 had been recommended.
House ..	1 GB.4	74,250	112	3,074	62 4	Includes hot water from 2 Solar boilers.
Shop ..	1 GB.4	74,250	62	1,240	27 4	
Reptile House	1 GB.4	74,250	168	1,989	41 6	Temp. of 70° F. required.
House ..	1 GB.4	74,250	112	615	22 15	Minimum cons. is 1,000 therms.
House ..	1 GB.4	74,250	112	1,003	22 16	
Office ..	1 GB.5	99,000	62	745	22 15	Minimum as above.
House ..	1 GB.5	99,000	112	1,111	24 17	
House ..	1 GB.5	99,000	112	1,169	25 18	
Office ..	1 GB.5	99,000	62	759	22 15	Charged for minimum of 1,000 therms.
House ..	1 GB.6	123,750	112	1,753	36 17	
Shop ..	1 GB.6	123,750	62	1,555	33 0	
Shop ..	1 GB.6	123,750	62	1,574	33 7	
House ..	1 GB.6	123,750	112	3,386	67 10	
Animal Clinic	1 GB.6	123,750	168	3,535	70 6	
House ..	1 GB.6	123,750	112	2,561	52 0	
Shop ..	1 GB.6	123,750	62	1,509	32 10	
Works ..	1 GB.6	123,750	62	1,628	24 10	
House ..	1 GB.6	123,750	112	1,413	30 10	
College	1 GB.7	148,500	45	2,710	54 6	
Office ..	1 GB.7	148,500	62	900	22 15	Part occupied.
Shop ..	1 GB.7	148,500	62	1,711	36 0	
Works ..	2 GB.6	247,500	62	2,738	55 8	
Shop ..	2 GB.6	247,500	62	2,324	47 10	
Shop ..	2 GB.6	247,500	62	3,285	65 12	
Church	2 GB.6	247,500	24	1,659	35 0	
Works ..	3 GB.5	390,000	62	5,571	108 9	
Offices ..	3 GB.5	390,000	62	4,701	92 2	
School ..	3 GB.6	520,000	45	4,128	81 8	
Office ..	Conversion Set	95,000	62	1,087	24 8	Sometimes left on over night to dry negatives.
House ..	Conversion Set	95,000	112	1,107	24 16	
Stores ..	Vesta C.2	800,000	62	7,425	137 8	
Stores ..	2 Vesta C.3 1 Vesta B.1	2,650,000	62	17,133	292 13	Includes domestic hot water services.

It does not appear from the table that there is any uniformity in the annual cost from a given size of boiler. In many installations for private houses, however, it has been found possible to use a figure of 350 therms per season per 1 GB per 12 hr. heating per day.

(To be continued.)

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION

THE PRESIDENT.

Mr. F. S. Johns was educated at Wrekin College and at Swansea and Cardiff Technical Colleges. In 1930 he was articled to his father, Mr. W. H. Johns, Engineer and Manager of the Swansea Gas Light Company. On completion of his articles Mr. Johns was appointed to the position of Technical Assistant to the Swansea Company, being subsequently promoted to his present position of General Assistant for Works and Distribution. The family is well known in the Industry, for, in addition to his father, Mr. Johns' brother is Engineer and General Manager of the Rotherham Gas Department, while his uncle is Managing Director of the Lowestoft Water and Gas Company

Presidential Address

OF

F. STUART JOHNS, Assoc.M.Inst.Gas E.,

of Swansea.

Presented at the Opening Meeting of the Association held at Swansea on Saturday, Oct. 15, 1938.

I intend to confine my remarks to sales and distribution matters. Taking first the all important domestic load, it is pleasing to note that our burner maintenance scheme (under which consumers' burners are maintained for a purely nominal payment) has ensured for us the retention of a considerable volume of business in the lighting field, and justification for our action in inaugurating such a scheme has been secured in the number of consumers who have taken advantage of the special facilities it affords.

Further maintenance schemes comprise:

1. The free maintenance of the usual domestic appliances—cookers, fires, wash boilers, &c.—on permanent hire and on hire purchase terms;
2. The free maintenance of water heaters and refrigerators, whether purchased for cash or secured on the extended payment system;
3. The periodic maintenance of all appliances installed in hotels and restaurants, and of radiator installations in churches, cinemas, &c. In these instances we make no charge for labour, but merely charge for the materials used.

Other inducements offered include:

1. The fixing of one or two ring burners, free of charge, in every case where we know an electrical cooker is installed;
2. The fixing of a ring burner for the nominal sum of 2s. 6d. in those cases where, for various reasons, we have been obliged to bring in the cooker;
3. The fixing of lights for prepayment meter consumers, additional to the usual complement installed free of charge, upon payment of a nominal fee of 2s. 6d. per light.

We have also extended our hire purchase scheme from three to five years, and, in certain cases, even to seven years. This has resulted in a considerable increase in the volume of business transacted. We have introduced special prices for: Central heating, bakers' ovens, fish and chip ranges, and industrial processes. Notwithstanding competition from locally-mined anthracite, we have been successful in obtaining several central heating installations on account of the special advantages gas offers, particularly for the heating of blocks of offices, shops, and certain factories, where the storage of solid fuel was difficult to arrange, and where ease of temperature control, adaptability, and cleanliness were considered to be matters of importance.

Our first success was achieved at one of the town's leading shops, noted particularly for its modern equipment. The premises had been re-designed, and we were called upon to submit schemes for adequately heating the building, either by means of individual units, or by central heating—gas or coke. Needless to say, competition from other forms of heating media had to be considered, but following consideration of our claims a gas central heating boiler was installed.

In rapid succession we were instructed to carry out an installation at a private residence and to arrange for a supply of gas to a central heating and air conditioning plant at Messrs. Marks & Spencers' local branch. These successes conveyed to us the potentialities in this field of operation, and indeed so important did we consider the possibilities that it was decided to invoke the co-operation of a well-known firm of heating engineers, so that the services of experts should be at our disposal.

Following this scheme of co-operation, our next installation was carried out at premises occupied by a firm of bottlers. In making our preliminary investigations it was found that they had in operation a large coal-fired steam boiler, which produced all steam necessary for both the factory and the beer storage room. The latter had at all times to be maintained at a temperature of 58° F., and under the existing arrangement this necessitated firing the boiler during those periods when the use of steam in the factory was unnecessary (week ends, &c.). This involved not only a wastage of fuel, but also the continuous attendance of a boiler fireman, and, further, much difficulty was experienced in securing the exact temperature required.

We submitted two schemes:

(*a*) The installation of a completely new heating system of the low pressure hot water gravity type, with radiators, and

(*b*) The installation of a small steam boiler to supply steam at 7 lb. pressure to the existing steam heating pipes, complete with automatic pressure and room temperature controls.

Owing to the high capital cost involved under scheme (*a*), scheme (*b*) was accepted. The boiler has operated to the complete satisfaction of the consumer, the actual fuel costs having worked out at a figure even lower than was originally anticipated.

Oil Displaced.

Another installation of interest involved the displacement of an oil-fired boiler of the sectional type, employed in connexion with the heating of a block of offices. The existing boiler was a comparatively new one and worked satisfactorily, so that in approaching the owner we had to justify our arguments for its displacement. We emphasized, in the first place, the safety factor, by explaining that a gas installation would eliminate the necessity for storing in so important a business house large quantities of oil (necessary to ensure cheap rates); and as we coupled with this a guarantee

that fuel costs in running a gas central heating boiler would not exceed that of oil firing, our offer was accepted.

Two further installations are provided by the following:

1. The installation of a gas-fired boiler for the central heating of a high-class café, in lieu of a coal-fired boiler. In this instance, the cleanliness of gas and the other advantages which I have previously mentioned are considered to be an adequate recompense for a slightly higher fuel bill, and complete satisfaction has been expressed.

2. The displacement of a coal-fired boiler used in connexion with an intermittent supply of hot water to a rotary bottle washing plant at the Swansea premises of Messrs. Wm. Hancock & Co., Ltd. On this occasion we pointed out the wastage involved in continuously firing a boiler merely to give a hot water supply required at infrequent intervals, and stressed particularly the saving in fuel and labour costs that an automatically-controlled gas-fired boiler would ensure. We also mentioned the importance of eliminating from the washing room all dust and dirt, and the saving in fuel storage that a gas installation would bring about.

Our attention is now being directed towards the conversion of sectional solid fuel central heating boilers, as it has been found that many consumers would immediately change over to gas if the capital cost involved could be minimized by using an existing boiler. Several of these propositions are being considered, and I am confident that very shortly numerous orders to convert existing solid fuel boilers will be secured.

Bakers' Ovens.

It will readily be appreciated that the heavy expenditure involved in installing a new oven is such that unless a desire to change over from solid to gaseous fuel coincides with a need for replacing an existing oven, the substitution—in view of the expense—is not practical, and since the majority of coke-fired ovens in our area of supply are still in fairly good condition, it is not reasonable to expect their early displacement.

As an alternative to our efforts to secure orders for new ovens, we have therefore considered the advisability of advocating conversion sets, and we have recently converted an oven of the three deck type, having a capacity of 1½ sacks per batch (per bake). The present throughput is seven sacks per day, and on this basis the calculated consumption per sack of flour (including the daily heating up of the oven) is 3 therms.

The full capacity of the oven is 7½ sacks per day, but unfortunately it is not practical, at the moment, to work it to its full extent. During a short trial period when this was possible, however, we obtained the low figure of 2·6 therms per sack, which, for a conversion set, is considered to be very satisfactory.

We anticipate that in the immediate future we shall obtain two further orders from other bakeries, and no doubt additional business will follow as the new system becomes more generally known.

Fish and Chip Ranges.

This is a field in which we at Swansea have had a great measure of success; the large establishments have already installed gas-fired ranges, and we are keenly anticipating the time when all fish frying in our area of supply will be performed by gas. In the newest type of range, such as that being installed in this district, the special selling feature lies in the fact that, apart from cleanliness and ease of control, it eliminates the presence of the usual smell which one associates with fish frying establishments, and ensures that not even the friers' clothes shall be contaminated.

This is something for which the frier is prepared to pay; his sales are augmented; his customers are satisfied; he himself is happy in the knowledge that the old drudgery associated with this type of business is for ever at an end.

When all these advantages can be obtained without even increasing the fuel bill (as is the case with the range to which I have referred), it will be appreciated that this is a load which can be completely secured, providing the price of gas is right. At any rate, our initial successes at Swansea have been so gratifying and have given us such a useful advertising medium that we are confident that the time is not far distant when all fish frying in this town will be performed in gas-fired ranges.

We at Swansea, in common with others, have now in force a scale of gas charges for industrial purposes which enables us to place before manufacturers schemes which are economically sound. It is not my intention in an Address of this description to enumerate each and every success which we have achieved; I think it will suffice if I just give you a few illustrations of what can be done in this very important field.

Following the introduction of our special scale of charges, our first success was obtained at a local cold storage depôt, in which we installed a gas-fired boiler capable of quick steaming, to operate at 100 lb. pressure, with an evaporation of 315 lb. of water per hour. The boiler was to be used in connexion with a new ice cream manufacturing section, and, needless to say, competition from other fuels had to be faced. Gas was preferred chiefly on account of its cleanliness and flexibility, and the boiler, which has a consumption of about 1,000 cu.ft. per hour, has operated continuously throughout the past summer. So satisfied is our consumer that we have been invited to prepare a scheme of gas heating for thawing the ice boxes in connexion with the manufacture of block ice, and everything points to our further success.

The provisions of the Factories Act, 1937, will be familiar to most of you, but for the benefit of those who have not been called upon to study them, I would briefly mention that, *inter alia*, it is now compulsory that all chains and other lifting tackle shall be annealed, tested, and certified at regular intervals.

Before the Act came into operation, in July last, a progressive engineering firm in this town gave consideration to the installation of such plant as would enable them to deal with the annealing of chains, lifting tackle, shackles, &c., and for which we submitted a scheme, in competition with electricity and oil, for a gas-fired annealing furnace. We were successful in securing the order, and proceeded with an installation capable of annealing 5 cwt. of chain, &c., per hour.

The furnace has proved in practice to be very efficient, and it effects the annealing satisfactorily on a maximum gas consumption of 1,300 cu.ft., or 5·8 therms, per hour; the time taken for annealing varies, of course, with the size of the links, shackles, &c., with which it is called upon to deal. Our consumer has not only expressed complete satisfaction, but has already intimated his intention of installing a duplicate furnace, identical to the one already in operation, immediately an expansion of business warrants it.

Another interesting installation is provided by the boiler installed at the local Technical College. This particular boiler, of the vertical type, is 4 ft. 6 in. in diameter, has a heating surface of 239 sq.ft., a working pressure of 150 lb., and an evaporation of 1,000 lb. of water per hour. It is fitted with an injector and an automatic steam pressure regulator, and consumes approximately 3,500 cu.ft. of gas per hour. The boiler serves a dual purpose, in that it is employed not only for driving the main steam engine and other plant in the engineering shops, but also for demonstration and test purposes by the more advanced engineering students. The advantages of gas-fired boilers is thereby inculcated into the students, and an invaluable advertisement is thus assured.

The largest industrial installation which we have as yet carried out is that in connexion with the supply of gas to a new Government Factory in our area of supply. In this case, the estimated gas consumption is 20,000 cu.ft. per hour, at 1 lb. per sq.in. We were able to offer gas at this pressure, as the works to which such supply has been given is adjacent to the Company's existing 12 in. high pressure main connecting our works at Morriston and our gasholder storage depôt at Oystermouth Road.

One of our most important local industries is that concerned with the production of tinplates, and it is therefore pleasing to note that, following negotiations extending over the past twelve months, we have just received from a comparatively large works an order for the heating of their mill rolls. This initial success will doubtless be followed by enquiries from other tinplate manufacturers, not only for gas for the purpose already mentioned, but also, we hope, for the heating of tinpots, annealing furnaces, and the like.

A vote of thanks to Mr. Johns for his Address was proposed by Mr. H. V. Williams and seconded by Mr. W. R. Branson. Mr. Johns thanked the members for their interest in his Address.

Maintenance and Control of Gas-Works Plant

Presidential Address

OF

H. PLATT,

Engineer and Manager of the Bolton Corporation Gas Department.

THE PRESIDENT.

Mr. Harold Platt was educated at Hindley & Abram Grammar School. He studied engineering and allied subjects at the Salford College of Technology. After serving his apprenticeship with Messrs. Naylor Bros., Engineers, of Golborne, he joined the staff of West's Gas Improvement Company, Ltd., as a Technical Draughtsman. In the capacity of Engineer he was also with Messrs. Lambourne & Co., Ltd., Engineering Contractors, of Manchester. In 1929 he entered the service of the Bolton Gas Department, and three years later was appointed Superintendent of the Gas Street Works. He became Assistant Gas Engineer in April, 1935, and Chief Engineer this year. Mr. Platt is a Member of the Institution of Structural Engineers, and has been a Lecturer in Gas Engineering at the Manchester College of Technology since 1927.

Presented at the opening Meeting of the Manchester and District Junior Gas Association held at Bolton on Oct. 8, following a visit to the Corporation's Gas Street Works.

The policy and management of a works are predetermined, and upon such basis the part of the junior is so to fulfil his duties and to arrange his work that the highest efficiency possible is attained and maintained.

The first real step of the junior upon entering the profession is to understand that technical knowledge must be acquired, and to this end educational facilities are available under The Institution of Gas Engineers Educational Scheme.

On the works each junior has a definite place in the whole scheme of management, and according to the manner in which he fulfils his duties so depends his future promotion, or otherwise, and his possible movement about the different sections of the works.

I will endeavour to indicate some of the points which, in my opinion, tend towards the production of maximum efficiency.

First, we have the handling of the incoming coal. The relative cost of this operation is small, yet some saving can be effected by a little forethought. Assuming you have arranged for a regular supply of coals, segregation should be easily effected and the crusher and conveying plant run over a minimum number of hours at maximum capacity. This will reduce the wear and tear upon the conveying plant.

One point which should not be omitted is to sample continuously all the incoming coals, test them for quality, size, obtain proximate analyses, and compare the results with the specification of the materials bought.

Secondly, we have the retort house, and on this section of the plant it is most easy to lose efficiency. Certain combinations of coals have points of optimum efficiency and, these having been determined, it is the function of the junior to maintain that optimum. With the retort house bench working to full capacity, generally speaking it is not wholly a matter of efficiency, but rather of gas output. With the bench not on full capacity, however, the optimum efficiency can be maintained, and the factors influencing such are even temperature control relative to throughput and steaming percentage. Even temperature control can be obtained by the proper working of the producers, the uniform supply of coke to the producers, the regular charging and cleaning, and the steady feed of constant quality producer gas to the setting. The junior can ensure this by regular attention to the routine.

Considering now the steam that can be converted for a certain coke temperature in the retort, coupled with the class of coal and throughput, there is an optimum percentage, and at the Gas Street Works this is found to be within a close range and is quoted at 18-22 lb. pressure. Since most works do not possess steam recording meters, the measurement of steam used on different parts of the plant has to be obtained by inference and calculation, and with regard to the retorts we check the amount by maintaining a regular pressure of steam through an orifice of definite size. The pressures quoted above have been obtained by prolonged series of experiments up and down the scale. The maintenance of the optimum efficiency is further checked by the preparation of weekly and monthly balance sheets on the retort house productions and costs.

The manner in which the carbonizing plant is operated, including heats, throughput, and steaming, &c., in my opinion, influences the wear and tear upon the retorts. Again, systematic examination and patching of the retorts during the scurfing period will add to the efficiency, and the junior should employ some simple system whereby the working history of the retorts is recorded. By such method I am sure it will be found that the maintenance costs of the retorts will have been reduced to a minimum.

The continuous and copious washing of the gas with hot ammoniacal liquor has reduced the troubles in the collecting and foul mains, and running parallel with it we have had a reduced total sulphur content in the finished gas. Within the past few months modifications in the quality of our saleable liquor has been required of us, and experiments have been made and alterations to our liquor plant have been effected. A whole series of figures is being obtained which upon completion may, or may not, be sufficiently interesting to form a separate Paper.

A supply of regular quality and grade of coke is now the constant demand of the consumer, and the junior can ensure this by regularly inspecting the output of coke from the retorts and by attention to the screening plant. Variation in the quality of coke from the retorts (assuming the same class of coals) can usually be traced to variation in throughput, steaming, or segregation. By noting the effects and tracing the causes thereof the junior can increase the general uniformity of the coke supplies.

In steam raising, the modern practice is to employ waste heat boilers at the outlet of the retort bench, and the first points of attention are to maintain constant draught and to ensure that the maximum temperature inlet is not exceeded. In point of fact the recording pyrometer will chart the variations in the temperatures, and the junior in charge, provided he has by previous experience correlated effect and cause, should immediately be able to place his finger upon the cause of such variations whether it be retort leakages, excess CO, or boiler fan fluctuations. The amount of steam obtainable

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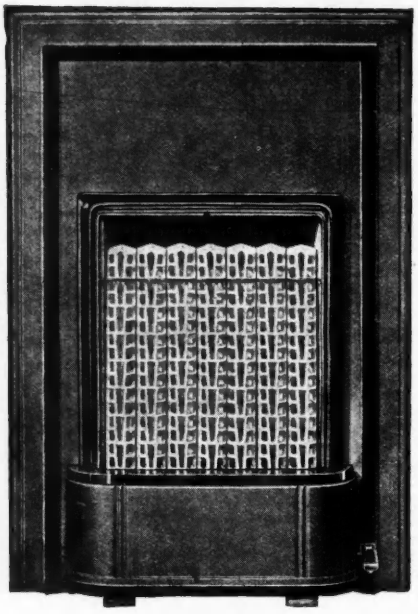

Literature obtainable on request.

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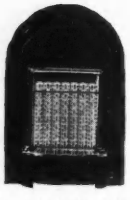

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from the normal type of waste-heat boiler cannot be varied except by variation in retorts in operation. In order to compensate for this feature, it is now a common practice to introduce an augmentation flue from the producers, and by this means the boiler can be maintained at the maximum designed output. Here again the chief points to watch are that the maximum inlet temperature of the boiler is not exceeded, that the fan is not overloaded, and that the draught on the retorts is maintained, and at such times when the augmentation flue is not in operation to ensure that leakage of CO from the producers has not taken place and that the augmentation flue is properly ventilated. Attention to the drop in pull through the boiler should be given, and in practice we have found that it is possible to rod out the boiler tubes once per month and maintain the minimum speed on the fan.

The even temperature control of the retorts was found to be seriously affected by accumulation of dust in the flues, and we now have a regular routine for cleaning each retort during its scurfing period. This means that working retorts are not interfered with during their gas making period.

The steam requirements of a works are usually augmented by some type of boiler, usually a Lancashire boiler, and it should be appreciated by the junior that the wastage of steam on any section of the plant means loss of coke for sale, and such points as leaking joints and valves and wastage of steam in any direction should be eliminated.

When our first waste heat boiler was installed very serious trouble arose by the employment of untreated town water. It is now accepted that only water which is properly treated shall be passed forward to the waste heat boiler plant. A softening plant of our own design was installed, and since that time borehole water has been brought into use and the internal condition of the boilers is now thoroughly satisfactory; in point of fact, the old scale formation has been broken up. The proper functioning of the softening plant has also reduced the troubles due to sediment and dirt in the steam affecting the steam valves and pipe range. The boilers are under systematic control and continuous blowdown and daily tests are taken. Patent dirt traps on the boiler stop valve were at one time contemplated, but they have now been deemed not to be wholly necessary.

One point which the junior in charge of the boiler plant should not overlook is to arrange the boiler inspections at times when the plant can be most easily spared, since waste heat boiler internal inspection at heavy load time means additional coke to the auxiliary plant. The junior should ensure that he has recorded all the points requiring attention before a shutdown, since the defects are only evident when the plant is in operation and unless such a course is adopted it is possible to start up again with initial defects. Boiler inspections are usually undertaken by insurance companies, but it is not unwise for the junior to make his own inspection and form his own reports of the boiler plant, and in cases where superheater tubes are installed he should bear in mind that deposition of dirt can take place in these tubes, and he should ensure that there is a clear steam way through each tube. When the steam boiler is in operation regular readings of the steam temperature through the superheater tubes should be taken.

In the control of the condenser plant the atmospherics are used to a maximum capacity, and the required temperatures at the exhausters are controlled principally by the water condensers. Periodic cleaning and examinations are made and leakage in the atmospherics is ultimately indicated by excessive oxygen in the purifiers, whereas leakages in the water condensers is indicated by excessive condensate.

On the exhauster plant each machine is run a full span of carbonizing operations and every year all the machines are dismantled in turn and completely overhauled and reassembled during the summer months. The points which the junior has to watch during the running operations are the oil temperature, the condition of the oil, and general lubrication. With the introduction of oil coolers, separators, and sampling, a minimum loss of oil on the exhauster plant has been effected; these points have been applied to the generating machines.

A systematic examination of the charts on the washers and scrubbers indicates whether the machines are functioning satisfactorily, and unless there is some indication of definite fault the machines only receive a cursory examination during the summer months.

The dry purification plant is tested daily, temperatures are recorded thrice daily, and a history is kept of each box, particular attention being paid to the oxygen content of the gas inlet. The system of Weck's valves is examined and overhauled at such times as may be determined by the management.

At the Gas Street Works there is a standard type meter and two Bailey meters, the latter being checked by the standard meter in rotation, and the standard meter checked once per year for tightness. The chief duty of the junior is to ensure that the water level and overflow of the standard meter are always correct and that the connecting pipes to the Bailey meters are free. The average readings of the Bailey meters when working in conjunction with the standard meter are accepted for the period when the meter is working by itself.

During the course of the daily operations it is always the duty of the junior to draw the attention to any abnormal happenings, to use his skill, to employ himself to the best advantage of the Department, and to raise such points as he may deem worthy of consideration. To assist in this we have introduced a system of charts and logs whereby a complete history of the machines and plant is recorded year by year.

In conclusion, I would just like to make reference to the Air Raid Precaution Scheme, Inspection of Holders, Factories Act, and Road Traffic Act, each of which requires some type of organized scheme. These schemes are in process of development.

Vote of Thanks.

Mr. GRAHAM proposed a vote of thanks to Mr. Platt for his Address. The Address was one worthy of the Association, and would make a valuable addition to their records.

Mr. BURNET seconded.

Manchester and District Juniors

Annual General Meeting

The 40th Annual General Meeting of the Manchester and District Junior Gas Association was held at Bolton on Saturday, Oct. 8, 1938. Over 120 members assembled at the Moor Lane Offices to inspect the Gas Street Works. After the inspection, the members were entertained at tea by the Chairman and Members of the Bolton Gas Committee.

After tea, the PRESIDENT, Mr. Albinson, said that it had been particularly pleasing to him to meet, once again, members of the staff and workmen with whom he had been so familiar when he was at Bolton. In the past, Bolton had given a great amount of help to the Manchester Juniors. It had provided them with many Presidents, and one of their Staff had been Hon. Secretary for a considerable number of years.

Mr. R. L. GREAVES (St. Helens), in proposing a vote of thanks to the Chairman and Members of the Bolton Gas Committee, said it had been a great pleasure to inspect such a modern plant, and the results obtained from it were in keeping with a plant run on a scientific basis.

Mr. J. T. HAYNES, seconding the vote, expressed his appreciation of the kindness and encouragement which he had received from the Bolton Corporation, and, in particular, from the members of the Gas Committee. He had happy recollections of the ten years he had spent at Bolton.

Alderman BESWICK, Vice-Chairman of the Bolton Gas Committee, responded to the vote.

Mr. ALBINSON then installed his successor, Mr. H. Platt (Bolton), into the Presidential Chair. He thanked all those who had given him their support during his year of office.

Mr. PLATT moved a vote of thanks to Mr. Albinson for his valuable services to the Association. He had great pleasure in presenting him with a Past-President's badge as a reminder of his year of office.

The formal business was transacted, and the following officers were appointed for the 1938-39 session:

President.—H. Platt (Bolton).
Senior Vice-President.—J. Albinson (Manchester).
Junior Vice-President.—J. Graham (Lancaster).
Hon. Secretary.—F. Johnston (Manchester).
Hon. Treasurer.—E. Kenyon (Middleton).
Hon. Auditor.—F. A. Collier (Oldham).

In addition to the re-election to the Council of Messrs. H. H. Thomas (Liverpool), R. L. Greaves (St. Helens), and H. Burnet (Blackpool), Mr. T. V. Blake (Blackpool) was also elected.

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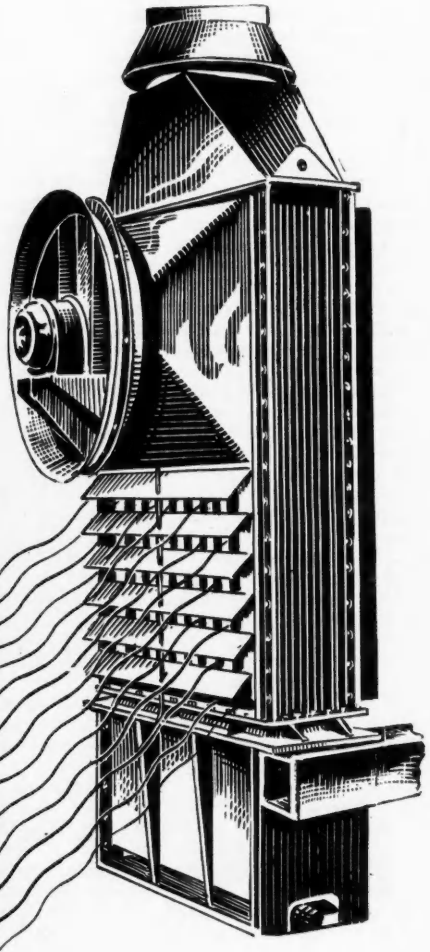

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SCOTTISH (WESTERN) JUNIORS

Presidential Address

OF

NORMAN C. STURROCK, Assoc.M.Inst.Gas E.,

of Greenock.

Presented at the Opening Meeting of the Association held in Glasgow on Saturday, Oct. 8.

THE PRESIDENT.

Mr. N. C. Sturrock received his early education at Allan Glen's School, Glasgow, continuing his studies at the Royal Technical College, Glasgow. He gained a First-Class Higher-Grade Certificate in Gas Engineering in 1932, in which year he became an Associate Member of The Institution of Gas Engineers. He entered the service of the Glasgow Corporation Chemical Works Department in 1922, and in 1930 was appointed Chemist and Technical Assistant to Greenock Corporation Gas Department, becoming Chief Assistant in 1932. Mr. Sturrock was Chairman of the Scottish Gas Salesmen's Circle for the sessions 1936–38.

It is a gratifying thought that, despite intensive competition, the Industry as a whole continues to show very satisfactory increases in the sale of gas, and although we as Juniors may sometimes feel we have little or no say in matters pertaining to the policy of our various undertakings, nevertheless I feel it is incumbent upon each one of us to keep in close touch with new developments and so be in a position to assist whenever possible in maintaining the increased use of gas for various purposes.

Despite the introduction of attractive lighting fittings and switches, I am afraid few can claim to be developing this load, although some are more successful than others in retaining to a certain extent that which they already hold. While this may be the case, we are more than making up for it in other directions, such, for example, as space heating, where with the improvements which have taken place in the design and efficiency of appliances we have more than held our own with our competitors. I do consider that there is still scope for development in this direction, and I believe that the introduction of the overhead type of heater, with its many advantages, has given us a powerful weapon with which we may further increase the sale of gas for space heating.

Debt to Manufacturers.

The increased sales of gas which have been recorded throughout the country are due in no small measure to the efficiency and growing popularity of modern gas apparatus. Without the wholehearted co-operation of the gas appliance manufacturers there might have been a different story to tell, and we are under a distinct debt of gratitude to these firms, which have done so much to develop appliance designs on modern lines and generally to popularize their apparatus.

Our Association has been privileged from time to time to visit some of the works where the manufacture of the gas apparatus is carried out, and I am sure we have all been impressed with the efficiency of these establishments; also with the care which is taken in the production of the appliances, and, last but by no means least, with the research work which is carried on in an endeavour still further to improve the performance of modern gas appliances.

We also owe much to the fact that the Gas Industry is now fully alive to what a sales policy really means, and strong efforts are being made to let the public know what gas is doing and what gas can do.

Greenock Gas Undertaking.

I now propose giving you some details of alterations and additions which have taken place in the Greenock Gas-Works since the last visit of the Association to Greenock in 1930, during the Presidential year of my Chief, Mr. R. D. Keillor. It may be of interest to state that for the year ended May 15, 1930, the quantity of gas made at Greenock was 688,499,000 cu.ft. and for the year ended May 15, 1938, 806,080,000 cu.ft., an increase of 117,581,000 cu.ft., or 17%, in eight years. The make of gas for 1938 is a record figure for the Undertaking.

The carbonizing plant consists of Woodall-Duckham continuous vertical retorts. In 1930 there were two parallel benches of eight settings, each setting containing four retorts each capable of carbonizing 5 tons of coal per day, and complete with internal producer and regenerator, the waste gases from the settings passing to a waste-heat boiler. In 1935 the East Bench was redesigned and rebuilt, and now consists of two benches, each containing 10 upwardly-heated retorts with a capacity of 5-6 tons each per day. At the same time the retort house was extended to accommodate a battery of four external producers at ground level, together with an additional elevated waste-heat boiler to deal with the waste gases from the new settings. The coal and coke bunkers were also renewed and provision made whereby one retort could be utilized for coal testing purposes.

The reconstruction of the West Bench of 16 retorts was commenced during this year, two of the four settings having been entirely rebuilt with larger producers at a lower level, simplified regenerators, and a new main flue to the original waste-heat boiler. It is intended that the remaining two settings will be rebuilt on similar lines next summer.

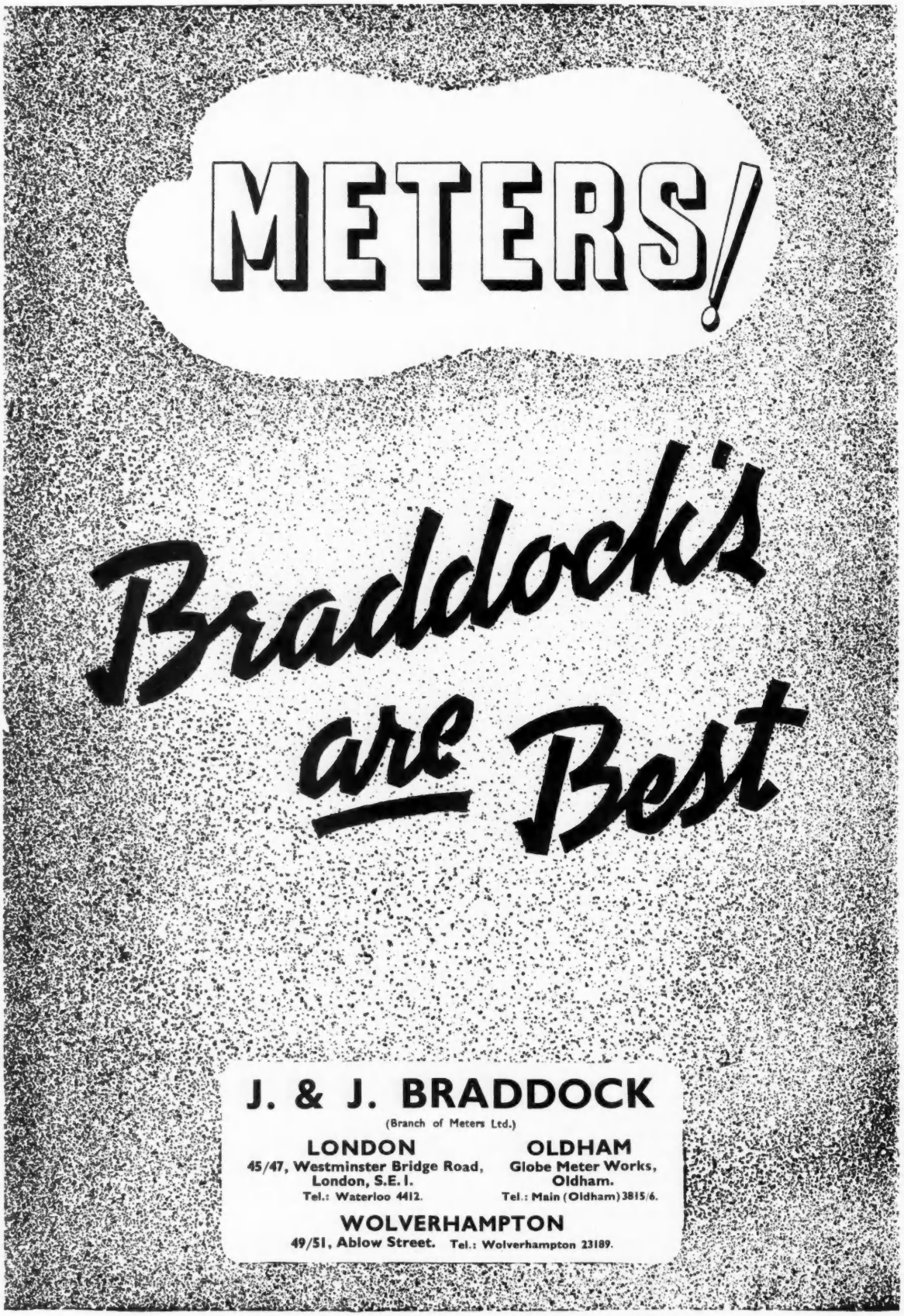
The horizontal retort house, which is used as a coal store, also houses a twin generator "K & A" water gas plant; this plant has been recently overhauled and the generators were completely renewed this summer. The water gas plant has a capacity of 500,000 cu.ft. per 24 hours and is available as a stand-by. One important advantage of this plant is that it can be brought into use within eight hours of lighting up if necessary. It may be mentioned also that the only remaining bench of horizontal retorts is now being demolished: this site will in all probability be utilized for modern automatically operated self-steaming carburetted water gas plant.

Coke Screening Plant.

The rotary type coke screens in use in 1930 have now been replaced by screens of the "Zimmer" type. A duplicate set of these screens was installed in 1935, and the remaining rotary screen was replaced this year.

The electrical energy required on the Works was once supplied by three direct-coupled shunt wound protected type D.C. generators driven by 42 b.h.p. gas engines of the British Westinghouse horizontal single-acting type. In 1933 one of these generator sets was replaced by a Peebles generator direct coupled to a three cylinder vertical "National" gas engine of 90 b.h.p.

In 1935 the small exhauster, which was rated at 125,000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WOLVERHAMPTON
49/51, Ablow Street. Tel.: Wolverhampton 23189.

cu.ft. per hour, was replaced with a machine rated at 200,000 cu.ft. per hour. Both exhausters are of Bryan Donkin's well-known type, each being driven by a slow speed horizontal steam engine.

The only addition which has been made to the purifiers was the introduction in 1936 of a "Triumph" gas heater capable of raising the gas temperature 50° F. when using exhaust steam. This was installed on the inlet to the purifiers; the 24 in. by-pass valve for this heater being inserted under pressure, while the inlet and outlet connexions were also made without interrupting the flow of gas.

It was also found necessary to strengthen the purifier house structure, and this was done in 1936 by erecting a steel framing on new foundations inside the existing brick building. A new oxide revivification floor measuring 107 ft. × 100 ft. × 4 in. thick was also laid in the yard adjacent to the Purifier House in 1937.

Plans are now on hand for an additional installation of purifiers, and our old purifier house is being demolished so that this work can be proceeded with at an early date.

Gasholders.

There is in course of erection a four-lift spiral-guided holder to replace a two-lift column-guided holder. The new holder is being erected in the brick tank of the original holder, and when completed will have a capacity of 950,000 cu.ft. The original holder which was installed 65 years ago had a capacity of 600,000 cu.ft. and only threw a pressure of 4·8 in. w.g. when fully inflated; the new holder should throw 12·5 in. pressure.

The existing gasholders have been duly inspected and reported upon in accordance with the requirements of the Factories Act, 1937, and at the end of these brief notes on the gas undertaking the results of the inspection are set out as a matter of current interest.

In 1936 one of the original compressors installed in 1913 and capable of delivering 20,000 cu.ft. of gas per hour against a pressure of 25 lb. per sq.in., was replaced by a steam driven vertical duplex Waller machine rated at 100,000 cu.ft. per hour.

In 1935 the Joiner's and Blacksmith's shops had to be demolished to allow for the extension of the retort house and new tradesmen's workshops were erected clear of the retort house. At the present time new stores and laboratory are being built in line with these shops. Meantime the power house, which is an annexe of the retort house, breaks the line of the new shops, but it is intended to bring this house into line with the new shops, &c., at a later date.

Gas Distribution.

As an indication of the expansion which has taken place on the distribution side during the past seven years it is interesting to note that the total mileage of main pipes has increased from about 80 to the present figure of 95¼, which figure does not include extension work which has been carried out this past summer and which is still in progress. While housing schemes account for a considerable proportion of this increased mileage, the greater demand for gas has made it necessary to extend the 24 in. trunk main in the central area of the town. We are also proceeding with a new 18 in. trunk main from the Works which will ultimately serve the east end. Perhaps I should mention for the benefit of those who are not familiar with the area of gas supply in Greenock that the Manufacturing Station is situated at the extreme east end of the town, and our aim in providing the new trunk main for the east end is to enable the existing 24 in. main to be used as a feeder carrying pressures above normal exclusively for the central area and outlying districts in the west and south-west areas, while the new main will be operated at normal pressures.

Showrooms.

On account of the amount of work which we had to cope with in the cooker renovating and service departments of the Undertaking, it was found necessary to secure a suitable site and to plan new buildings thereon for workshops, stores, and demonstration facilities. As a temporary expedient in 1937 premises near our own workshops were leased and are presently being used for stores and for the cleaning of cookers, &c., coming in from the district.

Schedules were duly prepared and tenders for the new workshops, stores, and demonstration hall on a site adjoining the existing premises, extending to some 700 sq.yd., have now been accepted; the erection of the new buildings should commence at an early date.

Strength of Existing Gasholder Sheeting.

As most of you will be aware, water-sealed gasholders have now been brought within the scope of the Factories Act and a much more thorough examination of these structures will be insisted upon in future. Owing to the length of service of the Greenock holders, it was considered advisable to investigate the mechanical strength of the sheeting; the sheeting is wrought iron in the older two-lift holders and mild steel in the case of the three-lift one erected in 1915.

Undernoted are particulars of the gasholders which are all situated at Inchgreen Gas-Works:

Holder No.	Number of Lifts.	Type of Holder.	Type of Tank.	Capacity, Cu.Ft.	Year Erected.
1	2	Column guided	Brick	400,000	1865
2	2*	Column guided	Brick	600,000	1873
2	4†	Spiral	Brick	950,000	1938
3	2	Column guided	Brick	600,000	1873
4	3	Guide framed	Steel	1,000,000	1915

* Scrapped. † Building in existing tank.

No. 1 Holder, which I believe was erected originally on a different site in 1865 and re-erected at Inchgreen in 1871, is retained principally as a water gas relief holder and as a feed for the gas compressors. It was decided to have test discs cut from the wrought iron sheeting of both lifts and one disc from the crown which had been renewed with mild steel sheeting in 1924.

No. 2 Holder, which I believe was erected in 1871, had become badly deformed, and it was decided to replace this holder with one of greater capacity and of heavier construction to facilitate working when it is found necessary to put either No. 3 or No. 4 Holders out of commission for internal examination or for repairs. The principal dimensions of the new holder which is being built in copper bearing steel are as follows:

Existing brick tank	123 ft. 11½ in. dia.	25 ft. 0 in. deep
Outer lift	121 ft. 0 in. ,,	25 ft. 0 in. ,,
3rd lift	118 ft. 0 in. ,,	25 ft. 0 in. ,,
2nd lift	115 ft. 0 in. ,,	25 ft. 0 in. ,,
Inner or top lift	112 ft. 0 in. ,,	22 ft. 2 in. ,,

The existing tank was found to be in excellent condition, but it was necessary to provide new rest blocks to accommodate the additional two lifts. In order to avoid alterations to the "dumpling" the inner lift was constructed with one row of plates less than the other three lifts and stepped reinforced concrete rest blocks were provided to suit this arrangement; these rest blocks were carefully tied into the dumpling.

No. 3 Holder was erected in 1873; it was therefore decided to cut test discs from the wrought iron sheeting of both lifts and one from the crown sheeting.

No. 4 Holder was erected in 1915 and is sheeted with mild steel plates. Test discs were cut from the sheeting of each of the three lifts and one was cut from the crown.

The thickness of the sheeting was in every case found to be satisfactory.

With regard to the tests for mechanical strength, *i.e.*, maximum stress in tons per sq.in. and elongation after fracture, % on 10 mm., these will also be seen to be satisfactory by comparison with the standards for new sheeting. Good quality new wrought iron sheeting should show: Maximum stress 18/22 tons per sq.in. and elongation 15/20% in 10 mm. lengths, while good quality new malleable iron sheeting should show maximum stress 24/28 tons per sq.in. and elongation 30/45% on 10 mm. lengths.

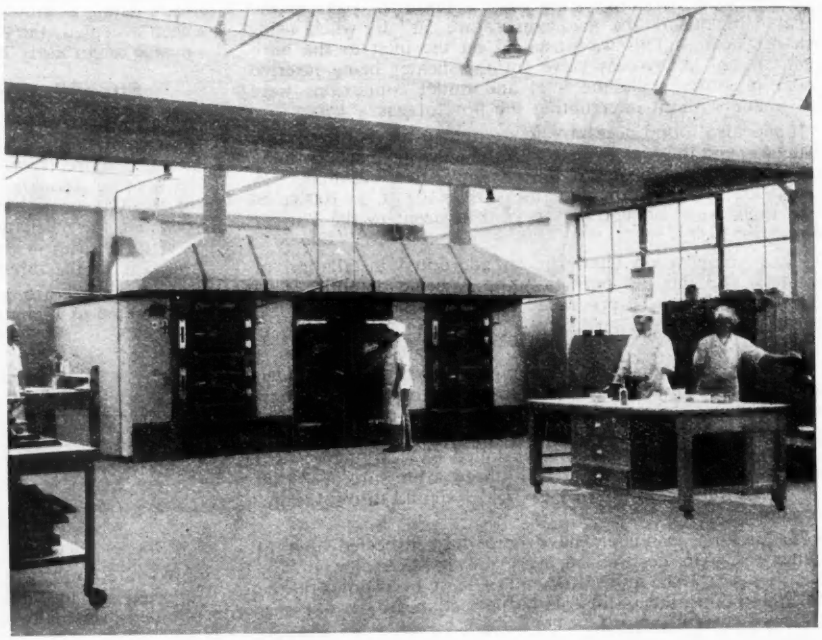
Bakery Problems Varied and Complex

Where the Specialist Comes In

The application of gas firing in the bakery has made vast strides in recent years. To-day there is no need for the dirt, dust, and ashes associated with the old methods. Automatic control has reduced, if not entirely eliminated, spoilt goods in the baking, and the baker or confectioner of to-day can almost forget the oven and concentrate entirely on the manufacturing of the goods.

These are some of the points which the gas salesman will stress to bakers, in addition to the spade work which is being done by bakery engineers themselves. There are on the market ovens for every class of trade from the smallest to the largest requirements. A good example is a block of double deck drawplate ovens installed at the Co-operative Society Bakery, Nelson, Lancs. These are dealing with a heavy bread trade by night and cake and confectionery by day. Very interesting comparisons can be made in this bakery, as these ovens are working alongside a similar set of coke-fired ovens, and the gas ovens are preferred from every standpoint.

Our illustration shows Peel Ovens erected for Messrs. Alfred Taylor (Bath), Ltd., Old Red House, Bath, which bake Vienna bread, and all classes of cake and confectionery. The ovens are thermostatically controlled. Whether the output be large or small, the same degree of satisfaction can be given.



Often the question of conversion to gas firing of existing ovens is put to gas undertakings. It is essential that any change-over shall give complete satisfaction, and bakery problems are so varied and so complex that the inexperienced, and even those who have experience, will be wise to take the advice of the bakery engineer, who is a specialist, before making any final recommendation.

Messrs. Thomas Collins & Co., Ltd., Bakery Engineers, St. Werburgh's Road, Bristol, whose ovens are illustrated above, tell us they are ready at all times to assist gas undertakings with information on any problem they may have in hand.

Western Junior Gas Association

Address by Institution President

The Opening Meeting of the Western Junior Gas Association was held at the Bath Gas Company's showrooms on Oct. 15—the PRESIDENT, Mr. A. Tran (Reading), in the chair. Among those present was Mr. Robert Robertson (President of The Institution of Gas Engineers) and all the Past-Presidents since the formation of the Association in 1926.

The PRESIDENT said that they were honoured by the presence of Mr. Robertson and grateful that he had been able to spare the time to attend their meeting.

Mr. ROBERTSON then addressed the members, at the conclusion of which the PRESIDENT invited Senior Officials present to say a few words.

Mr. H. STANLEY TAYLOR (Chairman of the Bath Gas Company) spoke of the pleasure it gave him to be with the Juniors on that occasion and to hear Mr. Robertson's remarks. Mr. Robertson, he said, had reached the top of the gas profession—an achievement at which they all aimed with the assistance of the Education Scheme. Mr. J. WESLEY WHIMSTER (Engineer and Manager of the Bath Gas Company) also voiced his appreciation of Mr. Robertson's Address. There were, he observed, several "rungs" near the "top of the ladder," and Juniors should strive to reach one of them—even if they did not reach the very top. Mr. J. TAYLOR (Engineer and General Manager of the Weston-super-Mare and District Gas Company) said the West Country was proud to have Mr. Robertson as President of the Institution and would support him well at all his meetings.

Mr. ROBERTSON, in reply, said he was overwhelmed by the eulogies which he felt he did not deserve. It had given him the greatest pleasure to prepare his Address, and he felt honoured to give it to such an appreciative gathering.

The PRESIDENT then presented Mr. J. E. Akroyd, the retiring President, with the Certificate of Office, for which Mr. Akroyd returned thanks.

The meeting then adjourned for tea at the kind invitation of the Chairman and Directors of the Bath Gas Company. The thanks of the Association of their hospitality were voiced by Mr. A. BELL (Exeter) and supported by Mr. S. SMITH (Bristol), Mr. H. STANLEY TAYLOR responding.

Mr. ROBERTSON then presented mementoes to all the Past-Presidents of the Association. These took the form of Silver Tankards, engraved with the name of the Association, the recipient, and his year of office. (At a dinner later in the evening the mementoes were put to good purpose in toasting Mr. Robertson as President of the Institution.) Mr. H. H. BROWN (Exeter) proposed a vote of thanks to Mr. Robertson for making the presentations. The recipients were as follows:

Name.	Year of Presidency.
C. Bateman (Bath and Harrogate)	1926
A. Marsden (Bristol)	1927
T. B. Armitage (Cheltenham)	1928
J. T. Spencer (Weston-super-Mare)	1929
A. Barrett (Frome)	1930
B. F. Harris (Trowbridge)	1931
G. C. Gunston (Bristol)	1932
S. Hole (Bath)	1933
D. L. Copp (Exeter and South Met.)	1934
J. H. Dyde (Plymouth and North Middlesex)	1935
S. B. Jones (Clevedon)	1936
J. E. Akroyd (Swindon G.W.R.)	1937

The informal dinner held later in the evening was attended by all the Past-Presidents, each of whom made a short speech.

TRADE NEWS

What the manufacturers are doing by way of new and improved appliances, plant, and processes.

"Acme" Fish Frying Ranges.

The latest addition to the extensive "Acme" series of gas-fired fish-frying ranges is the "Moderne." This model is claimed to be easier to work, cleaner to use, and in every way more convenient than a breeze or coal range. The makers state that their technical staff set out to achieve a really satisfactory gas-fired range, and the result has been the very efficient "Moderne"—a great step forward in modern range construction. The range is stated to operate at very low running costs and its system of heating gives absolute control under widely differing working conditions. The average time required to heat from cold is thirteen minutes. The design of the bottom of the pans ensures efficient heat transmission even when the burners are low. Among other features of the "Moderne" range are the following: Independently heated chip boxes; dual gas and air control, the volume of the air being automatically controlled according to the volume of gas passing to the burner; independent capacity damper control; and burner housing of the latest improved type.

Dry Vacuum Pumps.

There has recently been produced by Messrs. Reavell & Co., Ltd., a series of vacuum pumps for high efficiency duty for high vacua. These pumps are of the horizontal double-acting type, and the proportion of the cylinder diameter to the stroke has been chosen so as to give a small clearance ratio, the design and disposition of the valves having been arranged with the same object. Although these machines are intended to be used as dry vacuum pumps the suction valves are placed near the top of the cylinder, and the delivery valves near the bottom, so that if a small quantity of moisture comes in through the suction pipe, the cylinders will be self-draining. As the cylinder diameter is not large with relation to the stroke no tail rod is required for the piston, and, therefore, there is only one stuffing box through which leakage may occur to reduce the efficiency of the machine, and the gland of this stuffing box is readily accessible for repacking. The cylinder and cover are water jacketed with a view to keeping down the temperature of the rarified air under compression before delivery to the atmosphere, thereby helping to maintain high efficiency.

The cross heads, guides, connecting rods, and crankshaft bearings are all designed of generous proportions to ensure, with proper attention, long periods of running without adjustment. The valves used are of the ported plate type, and are of stainless steel, having a large area, and a very small lift. The springs provided for these valves are of ample diameter, and are designed so as to give the lightest possible spring load for the suction valves. All the bearings are in halves, and provided with shims for adjustment; the connecting rod top end bearing is of gunmetal, and the bottom end bearing of gunmetal white metal lined. The main bearing shells are cast-iron lined with white metal. The larger machines are provided with a multiple-feed lubricator driven by belt from the crankshaft, so as to provide a measured feed of oil to all the working parts.

From a table included in the firm's recent folder it is seen that at the normal speeds given the piston displacement available covers a range from 162 cu.ft. per minute to 2,000 cu.ft. per minute. The last two sizes can be made of the twin form with a suitable belt pulley connected by flanges to the shafts of the twin vacuum pumps so as to give capacities of 3,000 to 4,000 cu.ft. displacement respectively. The maximum vacuum obtainable with a 30 in. barometer varies from 29·4 in. with the small sizes to 29·6 in. with the large sizes. These machines are also arranged so as to operate on the two-stage principle, in which case the vacuum obtainable is within one-tenth of an inch of the barometer, the displacement and volume then being one half of that given on the list.

Perkins Clean Milk Equipment, Ltd.

Some notable new products are to be seen for the first time at the Dairy Show, Earls Court, London, on the stand of Perkins Clean Milk Equipment, Ltd., who, among many interesting appliances, are showing their self-contained gas sterilizing outfit, with double walls using exhaust heat gas also to heat sterilizer. Very low running costs are claimed for this appliance, 500 pint bottles being sterilized for 3½d.

Lighting Domestic Refuge Rooms.

The Nife "R" type lamp has been specially designed for lighting domestic A.R.P. refuge rooms and all places where, under emergency conditions, an all-round light is needed.

The "Nife" lamp employs a rechargeable all-steel accumulator which is claimed to last a lifetime and to provide 11 hours' continuous light on one charge. It is of the type which is used in thousands of miners' lamps where absolute reliability is essential to safety. The battery can be recharged for a few pence. The lamp is fitted with a ribbed well glass and this protects the bulb and also diffuses the light, thus preventing eye strain. As it is intended for use in a room and not as a handlamp, the added complication of a switch is not necessary. To obtain light, the battery is inserted in the polished wood box with the terminals towards the front, and, when the lid is closed down, the lamp will light as long as the fastener is in position. To switch off the light, release the fastener when the lid will automatically spring up.

Many years of experience in the manufacture of miners' lamps have enabled Batteries, Ltd., Hunt End Works, Redditch, to produce this safe and effective lamp.

"Keith" Lighting Raising and Lowering Gear.

Messrs. Keith Blackman, Ltd., 27, Farringdon Avenue, E.C. 4, have introduced a special winch for use in conjunction with the "Keith" raising and lowering gear. This gear, up to the present, has employed a winch with the usual flexible wire rope, but it has been found in some situations that this wire rope is subject to corrosion or deterioration due to particular atmospheric conditions. The firm have recently developed an alternative winch fitted with "Staybrite" tape instead of wire rope usually employed.

This type is claimed to possess many advantages, as it is immune from corrosion, and therefore does not deteriorate or require maintenance. Twisting is entirely prevented, and a device is provided to avoid coiling of the tape on the drum in the wrong direction. A special winch handle can also be supplied fitted with an overload release to prevent the overstraining of the rope, tape, or gear.

Engineering and Constructional Experience.

A handsome illustrated album has been prepared by Messrs. Newton Chambers & Co., Ltd., Thorncliffe, near Sheffield, which demonstrates the width of their engineering and constructional experience. During 100 years of development and the acquisition of that experience, the firm have always attempted to keep abreast of the individual and specialized requirements of a fast-growing mechanical age, and as a result the productions of Thorncliffe Ironworks have been extensive and varied. The range of productions presented pictorially in the pages of the album, therefore, while a fairly representative one, is by no means comprehensive. Among these examples are to be found an 8 million cu.ft. spiral-guided gasholder, a 3 million cu.ft. column-guided type, a high-pressure holder of 250,000 cu.ft. capacity and 50 lb. per sq.in. working capacity, purifiers dealing with 10 million cu.ft. per day, benzole plant, Thorncliffe ammoniacal liquor concentration plant of 40 tons per day capacity, static washers, horizontal and vertical tube condensers, and coke quenching car for coke oven plant.

Dust Removal.

Of recent years, increasing attention has been paid to the question of dust removal. The general experience of users of up-to-date dust removal plants is that, under the healthier conditions thus promoted more work and better work is done; while the reduced wear-and-tear on the machines, shaft bearings, &c., and the reduced expenditure for sweeping up and general maintenance of workshops represent sources of direct economy.

Keith Blackman dust exhausting plants in great numbers, are in everyday use, dealing with an almost endless variety of machines and processes—as set out in an interesting catalogue just issued by the firm.

There are two types of Keith centrifugal fans for dust exhausting work—the Paddle Wheel (or "P" type) and the Multivane. The "P" type is of heavy construction throughout, and may be regarded as fulfilling the requirements of the most severe conditions, as found in connexion with the conveying of wood refuse, wool, and other heavy materials. For moving large air volumes at moderate pressures, there is the "Keith" Multivane fan, but it should only be used for dust removal when the dust to be dealt with is of a fine non-clogging and non-abrasive nature.

SMITH METERS, LIMITED

HOTEL METERS OF DISTINCTION
EASY TO FIX — EASY TO OPERATE
EASY TO ORDER FROM STOCK

PHONE : REL (LONDON) 2447 - 8 - 9

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Oct.* 17.

Prices of Tar Products in the London market remain steady at the following levels:

Pitch, nominal at about 33s. per ton f.o.b.
Creosote, about 4¼d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Oct. 17.

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¼d. to 4⅜d.; low gravity, 4¼d. to 4¾d. Carbolic acid, 60's, 1s. 9d. to 2s. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal: "B" quality unsalable. Heavy oil: Unfiltered anthracene oil, min. gr. 1.080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1.080 5¼d. to 5⅜d.; heavy tar oil, gr. less than 1.080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Oct.* 15.

Enquiries are more numerous and, in some cases, makers have increased their quotations, although the general position is practically unchanged.

Crude gas-works tar.—Actual value is about 37s to 38s. per ton *ex* works in bulk.

Pitch remains very dull with supplies available at round 23s. to 24s. per ton f.o.b. for export and about 21s. to 22s. per ton in bulk for home trade.

Refined tar, in the home market, is reasonably active with prices unchanged at 3¾d. to 4d. per gallon. Export business is dull and consequently competition is keen at about 3d. per gallon in buyers' packages at makers' works.

Creosote oil.—This product continues slow at round the following prices: Specification oil, 4½d. to 4¾d. per gallon; low gravity, 5d. to 5¼d. per gallon; neutral oil, 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—There has, if anything, been an increase in the number of orders, but quantities are small and values are unchanged as under: Pale, 97/99%, 1s. 4d. to 1s. 6d. per gallon; dark, 97/99%, 1s. 2d. to 1s. 4d. per gallon; and pale, 99/100%, 1s. 6d. to 1s. 10d. per gallon; all according to quality, *ex* works in buyers' packages.

Crude naphtha commands 5¼d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is quoted at 1s. 3½d. to 1s. 4d. per gallon and 90/190 heavy naphtha at 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. to 9s. per gallon and 90/140 grade is 9s. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole ..	0	9½	to	0	10	per gall. at works
Motor " ..	1	3	"	1	3½	" " "
90% " ..	1	4	"	1	4½	" " "
Pure " ..	1	8	"	1	8½	" " "

Contracts Advertised To-Day

Retorts.

Glasgow Gas Department. [p. 230.]

Fertilizer Prices

The following prices are announced for the 1938-39 season by Imperial Chemical Industries, Ltd.:

	Per Ton. £ s. d.	For Delivery.
Sulphate of Ammonia	7 6 6	Oct., 1938
"	7 8 0	Nov., 1938
"	7 9 6	Dec., 1938
"	7 11 0	Jan., 1939
"	7 12 6	Feb., 1939
"	7 14 0	March-June, 1939
"Nitro-Chalk" ..	7 10 6	Oct., 1938/June, 1939
Concentrated Fertilizers.		
I.C.I. No. 1	11 13 0	Oct., 1938/June, 1939
I.C.I. No. 2	11 10 6	" "
I.C.I. No. 3	11 12 6	" "
I.C.I. No. 4	11 8 6	" "
I.C.I. No. 5	11 4 0	" "
I.C.I. No. 6	11 9 6	" "
N.P. Type A ..	14 16 6	" "
N.P. Type B ..	10 19 6	" "
N.P. Type C ..	13 3 6	" "

The above prices are for prompt cash, delivered farmer's nearest station in England, Wales, and Scotland, in minimum 6-ton lots, with the usual extras for smaller quantities. All prices are subject to alteration without notice.

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

REPEAT ORDERS

ARE NOW IN HAND FOR EXTENSIONS TO GLOVER - WEST VERTICAL RETORTS FOR THE FOLLOWING UNDERTAKINGS

- **Bedford**
- **Bergen**
- **Blackpool**
- **Coatbridge**
- **Coventry**
- **Dublin**
- **Hull (East)**
- **Leeds**
- **Le Mans**
- **Motherwell**
- **Oldbury**
- **Perth**
- **Romford**
- **Slough**
- **Sydney**

GLOVER-WEST VERTICAL RETORTS

. . . for coal carbonization with the advantages of modern scientific control

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C. 2

GAS STOCKS AND SHARES

The effects of the crisis are still much in evidence, and these coupled with uncertainty regarding the future have militated against any general increase in the volume of business on the Stock Exchange. Large sales of gilt-edged stocks were reported during last week and prices fell in consequence, British Funds closing anything up to 1¼ points lower. Railway stocks were doubly hit, reactions due to the continued fall in traffic receipts being accentuated by the recent labour troubles. Industrials were irregular, and apart from some improvement in the shares of those companies likely to benefit from an acceleration in the re-armament programme, quotations generally were marked down. The only bright spots were the rubber and base metal sections by reason of the increased prices of commodities, while several good features were noticeable among gold-mining shares.

There was a larger turnover in the Gas market last week, and although price changes were few most of these apart from *ex div.* markings were in an upward direction. In the Official List the largest increase was recorded by Mid-Southern Utility "C" consolidated, with a gain of 4 points to 101½. It will be remembered that this undertaking also supplies electricity and water, and by reason of recent acquisitions receipts from the former are now higher than those for gas, while water revenue is steadily increasing. In view of this the current price appears on the low side especially when compared with Bristol ordinary paying the same rate of dividend and which now stands in the London List at 111½. Watford and St. Albans ordinary and 5% preference stocks both made recoveries, and it will be seen that several other minor improvements took place. The margin of Imperial Continental narrowed to 5 points, leaving a net loss of 2½.

The only alteration of note on the Provincial Exchanges was a drop of 3½ in Hartlepool consolidated to 91. In the past few years this Company's sales of gas have shown a steady increase, while the receipts from water have gone up over 40% since 1928. A dividend of 5% per annum has been regularly paid since 1922, so that here again the current price appears on the low side.

Nominal quotations in the Supplementary List remained unchanged.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	132—142	...
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/—	...
444,389	,,	§—/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/—	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/—	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
560,070	Aug. 22	7	7	Barnet Ord. 7 p.c.	157—162	...
300,000	Oct. 10	1/9⅝	1/4⅜	Bombay, Ltd.	24/—26/—*	—/6
180,435	Aug. 22	9½	9½	Bournemouth sliding scale ...	195—205	...
640,407	,,	7	7	Do. 7 p.c. max. ...	152—162	...
495,960	,,	6	6	Do. 6 p.c. Pref. ...	130—135	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	75—80	...
312,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	120—125	...
855,000	Sept. 19	8	7	British Ord.	137—142	...
100,000	June 3	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Sept. 19	2/—	2/—	Colombo Ord....	1½—1¾*	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.... ...	22/6—24/6	...
739,453	Oct. 10	—/11·48	—/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/—*	—/6
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	22/6—24/6*	—/6
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84	...
140,000	,,	—	§13/4	Do. 4 p.c. Red. Pref.	95—100	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	70—75	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	...
200,000	,,	—	§30/2	Do. 3½ p.c. Red. Deb.	95—100	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div. ...	100—105	+2
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	113—118	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c. ...	95—100	...
186,155	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B' ...	19/—21/—	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅜	5⅜	Gas Light & Coke Crd. ...	22/—a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	76—81	+1
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref....	96—101	...
2,993,000	July 4	—	3½	Do. 3½ p.c. Red. Pref....	98—103	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb....	77—82	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb....	110—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb....	109—112	...
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb....	93—98	...
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2½	‡1/—	Hong Kong and China Ord. ...	¾—1	...
213,200	Aug. 8	6	5⅜	Hornsey Con. 3½ p.c ...	97—102	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	115—120	−2½
223,130	July 18	3½	3½	Do. 3½ p.c. Red. Deb....	87—92	...
235,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169	...
11,751	Aug. 22	10	8	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
45,000	May 23	†10	†10	Malta & Mediterranean ...	135—140	...
392,000	Oct. 3	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	97—100	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	99—104	+4
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...
390,076	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	95—100	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
125,000	July 1	3½	3½	Do. 3½ p.c. Red. Bds.	95—98	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	...
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	140—150	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	90—95	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9*	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Sept. 19	—/10⅜	—/10⅜	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	127—132	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	21/—23/—	...
871,636	,,	—/10⅜	—/10⅜	Do. 4½ p.c. Red. Cum. Pref.	20/—22/—	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/—	...
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	102—107	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	125—130	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	95—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	75—80	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	107—112	...
600,000	,,	—	§31/—	Do. 3½ p.c. Red. Deb. ...	97—102	...
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	113—118	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	108—113	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	95—100	...
250,000	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	90—95	...
888,587	June 3	5	5	Do. 5 p.c. Deb.... ...	113—118	...
250,000	,,	4	4	Do. 4 p.c. Deb.... ...	95—100	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Sept. 19	8⅜	9⅜	S. Western Gas & Water Ord.	16/—18/—	...
160,523	Oct. 10	—/10⅜	—/10⅜	Do. 4½ p.c. Red. Cum. Pf.	19/—21/—*	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c.	105—110	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—98	...
1,076,490	Aug. 8	6⅝	6⅝	Tottenham and District Ord.	125—130	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	115—120	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
334,615	June 3	4	4	Do. 4 p.c. Deb. ...	95—100	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—101	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	17/—20/—	...
1,051,280	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/—21/—	...
762,241	,,	—/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/—	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/—	...
1,066,186	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
375,689	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	125—130	+2½
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	95—100	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	113—118	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
400,000	,,	—	§25/—	Do. 3½ p.c. Red Deb.	97—102	...
558,342	Aug.	7	6⅞	Watford and St. Albans Ord.	128—133	+3
200,000	,,	5	5	Do. 5 p.c. Pref. ...	107—112	+2
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	110—115	...
200,000	,,	—	16/8§	Do. 4 p.c. Red. Pref.	95—100	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	90—95	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Oct. 14.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106	...
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 22	-/4½	-/4½	Associated Utilities 4 p.c. Pref.	16/—18/-	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	95—100	...
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	114—119	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,600	Sept. 5	9	8	Guildford Cons.	163—168	...
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112	...
68,250	June 3	5	5	Do. 5 p.c. Deb.	107—112	...
156,600	Aug. 22	7½	7½	Hampton Court Cons. ...	131—136	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	90—95	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Sept. 5	8½	8½	Luton Cons. 'A'	153—163	...
107,960	Sept. 19	5½	4	Mid Kent Ord.	8½—9½	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Sept. 5	6½	7½	Redditch Ord....	118—128	...
166,850	Aug. 8	8	8	Romford Ord....	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	112—117	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept. 5	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Sept. 5	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/—20/-	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Red. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	117—119	—1
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	111—114	...
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	99—101	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	99—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max....	97—99	...
13,200	Sept. 19	8*	7	Pontyp'l Gas & W. 10 p.c. 'A'	12¾—13¾	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11¼—12¼	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11¼—12¼	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	100—102	...
33,340	,,	7¼	7¼	Do. 7¼ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	109—111	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.... ...	121—123	+1
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—163	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	90—92	—3½
2,061,315	Aug. 8	5½	5	Newcastle & Gateshead Con.	22/3-22/9a	+/-1½
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88—89	...
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—136	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—143	...
55,000	June 3	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 14.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	129—141	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

a The quotation is per £1 of Stock. * Ex div.

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